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DEPARTMENT OF AGRICULTURE
ANNUAL REPORT
1953

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DEPARTMENT OF AGRICULTURE ANNUAL REPORT, 1953

PART I—AGRICULTURE IN 1953

Policy

The year 1953 will be remembered as one during which Emergency conditions prevailed, for the visit of a Royal Commission which concerned itself mainly with problems affecting the African lands, for the one-man Commission, in the person of Mr. L. G. Troup, who reported on problems and conditions affecting the development of European agriculture and for the grant of £5,000,000 by H.M. Government to intensify the development of African agriculture, plans for the utilization of which were drawn up by Mr. R. J. M. Swynnerton, Assistant Director of Agriculture, towards the end of the year.

A period of civil strife and difficulty such as Kenya has suffered seems, somewhat paradoxically, to act as a stimulus to progress. Perhaps foremost on the credit side in so far as this Department is concerned, is the acceptance and implementation of the policy of closer administration. New, smaller units, of which this Department forms a part, are springing up and the close contact with the people we serve, which in the past was achieved at the cost of much expensive and wasteful travelling, will now be more effectively maintained. There is no doubt that the concentration of European staff in receptive areas pays big dividends and the additional funds provided, particularly the grant of £5,000,000 by H.M. Government, will make this possible. From the Department's viewpoint a further important step forward is the acceptance by Government of a policy of individual rights in land. This is welcomed by the people and, in selected areas, consolidation of holdings within the clan boundary is being guided and planned by officers of the Department and farm plans are being provided to the individual. As provided for in the Swynnerton Plan, centres are being established for the training of African surveyors and provision is made for the recruitment of a large number of European surveyors so that recognized titles to land can be provided to African farmers in the near future. Now that we have this voluntary move towards consolidation of holdings there must be a swift follow-up in farm planning and in the issue of titles. Legislation to enable the granting of individual rights of occupancy to the land, with certain safeguards as to its use and inheritance, is being prepared.

A further gain, which has been most marked in some of the heavily-populated areas of the Central Province, is the remarkable strides made in bench terracing and in paddocking of the steeper Kikuyu lands. The benched lands, although commonly planted with cash crops such as coffee, pineapples and pyrethrum, are becoming increasingly used for food crops and are recognized by the African as the best permanent answer to soil erosion. Much of this work has been done by repatriated Kikuyu labour and by communal effort and our thanks are due to those officers of the Administration who have so strongly supported us in this policy. In some measure, too, in the Central Province, it has beeen possible to implement our ecological plans for more efficient land use. For example, in the lower Kikuyu country it has been possible for security reasons to erase most of the unsuited wattle plantations and they will be replaced by more suitable cash crops such as coffee and pineapples.

While it is accepted that one of the major contributions this Department can make to the easing and removal of the tension which exists in the troubled areas is the improvement in the economic status and standard of living of the individual peasant, and that this can probably be done most easily and most quickly by a rapid expansion in the production of high-priced cash crops, care must be taken to ensure that the pace of development is not accelerated beyond that which Africa can digest and assimilate. Enthusiasm must be tempered by thinking of to-morrow

as well as of to-day. In certain directions, particularly in cash crop development and notably coffee, we have years of research and investigation to guide us and given staff of the right calibre and training we can make early advances. But we cannot depart from the principle that the first duty of the Department is to ensure the food requirements of the people and therefore paramount in our considerations must be the introduction of farming systems which will maintain and enhance the fertility and productivity of the land. There is, however, a limit to the land available in Kenya and to the productivity of that land and unless something is done to reduce the present rate of population increase, or to provide other outlets for it, our drive for improved living standards will fail. We are feeling our way towards the prevention of unnecessary crop and food losses by the use of insecticides and fungicides and towards raising crop yields by the introduction of artificial fertilizers, but it is in the more general and all-embracing fields of good husbandry that advances must come. We have to the best of our ability devised farming systems for the varying ecological zones but our knowledge of what effect these systems will have on the land is sadly lacking: unless they at least maintain fertility the systems fail. We know very little, too, about the economics of the systems we advocate, and the general economy of the country as a whole, as well as that of the individual, must receive consideration. In our drive for consolidated holdings and the planning of individual farms, certain obvious economies, such as time and effort wasted in going to and from work, can be effected, but the time and effort saved must be put to productive use if the economic standing of the individual is to be raised. In certain very important fields therefore, the demand for development must recognize the need for research and investigation so that we build on safe and sure foundations.

To continue in what some will consider a "cold feet" vein, it is accepted that during this period of Emergency forceful reasons can be advanced why risks must be taken and why political expediencies have outweighed technical considerations. The extent to which the dangers of such undesirable moves can be overcome will depend on how far and for how long they are given precedence. I refer to settlement schemes and in particular to irrigation settlements where a number of schemes of some 3,000 to 5,000 acres each in the first instance are being developed by the labour of *Mau Mau* prisoners and detainees. The soil conditions of the various areas show marked differences and we as a Department are very deficient in our knowledge of irrigation farming methods. If the camps remain as camps for a sufficiently long time to enable us to obtain the technical know-how before final settlement by tenants is attempted, all may be well. I believe that there is a great future for irrigation in Kenya, not by major schemes (although the Tana River project still remains a tantalizing possibility), but by numerous modest schemes. The speed at which such developments can take place will be governed to a large extent by the success or failure of the pilot schemes now being constructed. They, therefore, must not fail and time must be given to determine and establish sound and economic systems of land use before settlement by tenants is effected. It is gratifying to record that Government has accepted as an essential prerequisite to the success of such schemes that all existing land rights in the irrigation areas be extinguished and that land rights be vested in a suitable Authority, the settlers becoming tenants of that Authority. An urgent need is officers with practical experience in irrigation.

The conservation of water is, as resources, men and machinery become available, beginning to receive the prominence it deserves. In Nyanza Province, for example, 70 dams were made during the year by heavy construction units and a number of smaller dams were made by hand labour. Out of the £5,000,000 grant from the United Kingdom it is proposed that £1,750,000 be earmarked for the development of water resources, embracing individual water supplies in the better watered areas, dams, boreholes and pipelines in the pastoral areas, irrigation

and swamp reclamation and investigation and training in irrigation. Particularly in the Kericho District, where enclosure and the development of individual holdings is most advanced, much thought and attention is being given to the development of individual water supplies by spring protection, by the use of rams or furrows and by roof catchment and storage tanks.

During 1953 a development of the utmost importance to Kenya and East Africa received official approval. I refer to the long overdue decision to provide the necessary finance for the development of a worth-while Agricultural Faculty at Makerere College. In the many learned views which have been expressed on the subject I have heard no cogent argument why, in a territory such as this, where the people and the country's economy are so predominantly dependent on agriculture, agricultural development should not precede any other form of development. Improvements in social services must be paid for and the only logical plan for development would seem to be to gear such improvements to the pace of development of the productive services. Even industrial development, which is sometimes advanced as a solution to many of our problems, requires that the remaining farming population works harder and produces more with great efficiency in order to provide the food and raw materials required by industry at prices which industry can accept and which are at the same time remunerative to efficient farming. The field for research and investigation is vast and demands that the best possible training in agriculture be provided and that the most talented African students are attracted to this profession so that the farming community can be ably guided and assisted by the science of agriculture to higher standards of farming and of living.

As further evidence that the principles outlined above are gaining ground, Government has accepted that the Egerton College of Agriculture must be put on a more secure and better basis in regard to finance and facilities, so that a training comparable with that available overseas can be provided. Under the Troup Report and the Swynnerton Plan the research and advisory services of the Department will be strengthened very materially. To the three training centres for Agricultural Instructors will be added facilities for the training of women Instructors. Farm Institutes, where the practising farmer and his wife receive a year's training in improved methods of agriculture, have been and are being developed. Generally, therefore, there are encouraging practical indications that the development of better land use is accepted as a challenge and facilities are being provided to meet that challenge.

In the universal advocacy of the alternate husbandry system as the correct pattern of development for the European and African highlands, difficulties such as the cost of the change-over, the need for fresh knowledge and skill on the part of the farmer and the time lag before the new system justifies itself by returns, receive prominence but a further factor which receives, to my mind, quite inadequate recognition is the inflexibility and lack of specialization in the livestock population. As compared with more temperate climes, rainfall is erratic and unreliable and seasons of glut alternate with shortages. Admittedly more and more farmers are turning to a "bank" of silage and hay to help to even out these fluctuations. Also the vegetative or growing phase is more rapid, more luxurious but shorter in time. This renders ley management much more difficult since most farmers aim at a stocking rate which the farm can carry in a bad year. Without the facility of store sales, stocking rates cannot be adjusted to seasonal farm needs. Droughts are frequently quite localized, and the under-stocking and over-stocking which results is a most serious deterrent to efficient ley management. On very few farms are sheep associated with cattle as part of the general farm economy and as our knowledge of pastures develops it is considered that sheep must be associated with cattle if the leys are to receive correct treatment and give the optimum return. This thesis on the need for specialization, and particularly the need for

encouraging stock rearing and finishing as separate enterprises with their attendant auctions, requires that two conditions, which cannot be said to obtain at present, be fulfilled. Firstly, it must pay, and secondly, the disease danger must be reduced to justifiable risks. On the first factor steps have been taken to bring the price of livestock and their products more into line with cereals but there is always a tendency for the latter to keep one ahead. The Kenya Co-operative Creamery caters for the products of the dairy industry and the activities of the Kenya Meat Commission and of the Pig Industry Board must receive every encouragement, for only in the development of a worth-while export trade can the system advocated be made to pay. On this aspect there is one other development which may assist and that is the payment of differential prices for livestock and their products according to the seasonal difficulties of supply. This, if adopted in a realistic manner, would assist in specialization. The question of stock movement is, of course, still largely bound up with the question of disease, but there are promising indications that the difficulties are being gradually eliminated or reduced. These views are advanced, not with the suggestion that they are immediately practicable, but to draw attention to a point of policy which it is thought has not received the prominence it deserves.

As could be expected, no spectacular progress can be reported from the European areas. In so far as the Department is concerned, research and advisory work was retarded by Emergency calls on our time and staff, but despite this, creditable progress was made in the fuller development of research stations, in soil and water conservation and in farm planning. The farming community suffered from the manpower call-up for the Security Forces, labour was a serious problem, in the most disturbed areas crippling restrictions had, for security reasons, to be placed on farming operations, many valuable stock were stolen and massacred and farm machinery and other capital assets sabotaged by the rebels. In such circumstances it is not surprising that the ever-growing move to intensify farming, with its consequent capital investment, received, in some directions, a temporary check. Nevertheless the Department's revenue-earning services, such as dam construction units, soil conservation, etc., suffered no diminution in demand. Indeed the country owes a deep debt of gratitude to the European farming community for the determination and fortitude they have shown and for the way they have assisted in maintaining the economy of the country. The loyal tribes, too, have played their part well and African agriculture is playing an increasing part in the country's development. As evidence that agriculture is going forward despite the Emergency, we have the wistful words of the Minister for Finance in his Budget speech—"Had it not been for the Emergency there would have been a very handsome increase in the General Revenue balance".

Weather

The Coast and Central Provinces, which suffered most from drought in 1952, enjoyed good rains in 1953. In the Nyanza and Rift Valley Provinces the long rains were barely adequate for crop production, and in the Southern Province the long rains failed. With the exception of the Rift Valley Province, the short rains were above average in all areas.

In Nyanza the long rains began late, after an exceptionally severe dry period, but they lasted long enough to produce good crops of food. The yield of cotton, which is planted after the food crops, was reduced as a result of late-planting followed by drought.

Following a dry year in 1952, the Rift Valley Province experienced one of the driest years on records. At altitudes above 7,000 ft. and in the normally wetter areas of the Province the low rainfall had very little effect on crops, but on the floor of the Rift Valley and particularly around Rongai and Njoro, losses were

TABLE A—RAINFALL OVER THE MAIN AGRICULTURAL AREAS OF KENYA—1953

DISTRICTS	RIFT		WEST RIFT		EAST RIFT		TRANS NZOIA		NYANZA		MAIN COFFEE AREAS		COAST AREA	
No of Stations	17		10		17		20		22		25		17	
MONTH	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall	Mean Fall 1953	Average Fall
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
January	0·30	0·97	0·62	1·32	0·38	0·88	0·14	0·73	0·81	1·79	1·01	1·38	1·53	0·65
February	0·25	1·34	0·03	2·10	0·32	1·05	0·15	1·34	0·81	3·14	0·10	1·60	0·40	0·46
March	0·91	2·93	0·75	3·74	1·47	2·49	0·87	2·79	3·35	5·44	2·79	4·50	1·69	1·97
April	4·66	5·75	6·03	7·20	5·31	5·46	7·22	5·93	11·21	9·36	5·25	9·51	7·44	6·18
May	3·21	4·86	4·79	6·31	3·32	3·98	5·52	6·19	6·13	9·57	5·30	5·46	13·61	12·92
June	4·52	3·39	6·43	5·18	2·87	2·40	5·05	4·65	5·81	5·70	0·83	1·66	0·84	4·80
July	2·04	4·60	3·27	5·87	1·84	3·81	3·52	6·23	2·54	5·19	0·32	0·66	7·26	3·12
August	3·33	4·74	4·57	6·61	2·66	3·70	6·10	6·41	4·68	6·30	1·37	0·92	4·04	2·58
September ..	1·53	2·67	2·12	4·09	1·20	1·67	1·57	3·95	4·41	5·69	0·97	1·06	3·21	2·36
October	2·51	2·11	3·01	2·50	2·77	2·25	4·39	2·99	5·58	4·30	2·88	2·76	9·17	3·05
November	2·61	2·64	1·40	2·64	4·26	2·80	1·95	2·24	5·24	4·64	6·02	5·71	2·33	2·78
December	1·54	1·74	2·91	2·03	1·65	2·00	0·94	1·14	2·76	3·58	1·48	3·50	1·09	2·67
YEAR	27·41	37·74	35·93	49·59	28·05	32·49	37·42	44·59	53·33	64·70	28·32	38·72	52·61	43·54

severe. Grazing was poor throughout the Province and in the semi-arid areas many springs, rivers and dams dried up.

In the Central Province the long rains began early and the rainfall was well distributed, so that large crops of maize and other foodstuffs were produced. The short rains were early and plentiful and at the end of the year crop prospects were good, a material factor in feeding the 80,000–100,000 Kikuyu, Embu and Meru repatriated to the Province.

The drought and famine conditions in the Southern Province, which followed the poor rains of 1952, continued for the first nine months of 1953. Fortunately, the short rains were well above average, especially in the Kitui District, where a good harvest is now expected.

In the Coast Province the long rains started early in March. There was a dry spell in June after which the rains continued everywhere until October and in the hinterland until December. Harvests of food crops were excellent and tree crops recovered from the previous year's drought.

(*The Director of Agriculture is indebted to the Director of the East African Meteorological Department for the following detailed notes on weather conditions and for Table A which shows the rainfall over the main agricultural areas of Kenya during* 1953.)

Rift Area.—Rainfall in the Rift was 27 per cent below the average for the year. In June falls exceeded the average by 33 per cent and again in October by 19 per cent. The rest of the year was drier than usual.

West Rift.—Amounts above average were recorded in June, October and December, but the other months were well below average giving a total for the year 28 per cent below the average.

East Rift.—Rainfall was above average in June, October and November, but the shortfalls in the other months resulted in a deficit of 14 per cent for the year.

Trans Nzoia.—Totals above average were recorded in April, June and October, but again the shortfalls in the other months resulted in a deficit of 16 per cent for the year.

Nyanza.—In Nyanza area totals in excess of average were recorded in April, June, October and November. The rest of the year showed deficits varying from 5 per cent to 89 per cent resulting in a total deficit of 18 per cent for the year.

Main Coffee Areas.—The long rains were very poor and amounts were substantially below average. October and November were about normal for the short rains, but December was 58 per cent below the average. August was 47 per cent in excess of average and the annual total was 27 per cent below the normal.

Coast Area.—The Coast area was the only area with an annual total above average, the excess being 21 per cent. The month of June was the driest on record but rainfall, well in excess of average, was experienced from July to October.

Food Production in African Areas

Following a lean year in 1952, the Nyanza Province will have a surplus of over 90,000 tons of maize from the 1953-planted crop, the second highest on record. There will also be small surpluses of sorghum, finger millet and rice. Localized food shortages, that occurred in the early part of the year, were met within the Province and by the end of the year stocks of food were more than adequate.

In spite of drought conditions, the African areas of the Rift Valley Province were self-sufficient in food. Local shortages in South Nandi and West Suk were met from the small surplus in North Nandi.

With the exception of the Kiambu district, where the long rains were poor, the Central Province had very satisfactory long and short rains crops. Food stocks

were low during the first three months, but ample for the rest of the year. At the end of the year there were small surpluses of maize, beans and potatoes, but these are likely to be consumed within the Province before the 1954 crops are harvested.

In the Southern Province food production in 1953 was on a very small scale. In 1952 the long rains were below average and the short rains were a virtual failure. The Province entered the year 1953 with a serious food shortage and there followed nine months of exceptionally dry weather. Most of the crops failed and by the end of the year official imports of food into the Province had reached 150,000 bags, most of which was maize or maize meal supplied to the Machakos district. Good short rains crops relieved the situation in the Kitui district but at the end of the year imports of food into the Machakos district were still continuing at the rate of 27,000 bags a month.

The Coast Province enjoyed good rains and excellent harvests. Following the poor short rains of 1952, food was scarce in some areas in the first half of the year, but from June onwards it was plentiful everywhere and there was a small surplus of grams and cassava.

On balance, the large surplus of maize from Nyanza was more than sufficient to meet the shortage of food in the Southern Province. By the end of the year the stores were nearly full and there was the prospect that some 20,000 tons of maize would have to be exported in 1954.

Agricultural Exports in 1953

The total value of agricultural exports decreased by more than £6,000,000 from the record figure of £22,752,477 in 1952 to £16,718,264 in 1953. One-third of the decrease was due to the reduced exports of maize and another third to the further fall in the price of sisal. The remainder of the decrease was due largely to reductions in the value of exports of cotton, coffee and tea. The only important exports which showed small increases in value were cattle hides, sheep and goat skins and wool.

Exports of the following eight commodities exceeded £500,000 in value, maize and pyrethrum falling out and sheep and goat skins coming into the table:—

	Position 1952	*1952* £	*1953* £
1. Coffee	(1)	7,123,360	6,712,730
2. Sisal	(2)	4,469,588	2,482,469
3. Wattle Extract ..	(4)	1,685,912	1,544,720
4. Tea	(5)	1,315,803	928,276
5. Cattle Hides ..	(8)	593,224	798,325
6. Wheat Flour ..	(7)	647,735	573,545
7. Sheep and Goat Skins	(–)	413,977	565,151
8. Cotton	(6)	1,098,271	511,792

The following table shows certain other agricultural exports of value:—

		1952 £	*1953* £
9. Pyrethrum ..	(9)	511,971	395,852
10. Maize	(3)	2,385,264	306,017
11. Castor Seed ..	(11)	392,463	266,721
12. Wool	(—)	240,689	257,100
13. Butter, including Ghee	(12)	391,123	239,495
14. Bacon and Ham	(14)	257,556	223,932

Table "B" gives fuller details of domestic exports from Kenya in 1953, while Table "C" gives comparative quantities and values of exports of Kenya produce for the years 1939 and 1950–53 inclusive.

TABLE B—DOMESTIC EXPORTS, KENYA—1953

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
LIVE ANIMALS CHIEFLY FOR FOOD—			
Cattle	No.	—	—
Sheep and Lambs	,,	—	—
Swine	,,	—	—
Poultry	,,	515	108
Other Animals (Goats and Kids)	,,	415	608
MEAT AND PREPARATIONS THEREOF—			
Meat of Swine (Bacon and Ham, Pork)	Cwt.	19,851	223,932
Other Meat and Preparations thereof	,,	9,304	77,198
DAIRY PRODUCTS, EGGS AND HONEY—			
Milk and Cream, Fresh	Gallon	2,586	447
Milk, Evaporated or Condensed	Cwt.	142	901
Milk, Dried (Powder)	,,	6	122
Cream, Evaporated or Condensed	,,	1,553	25,562
Butter (Fresh or Salted) including Melted or Clarified	,,	12,584	239,495
Cheese	,,	137	2,175
Eggs in the Shell	Dozen	170,112	32,744
Natural Honey	Cwt.	1	10
EDIBLE OILS AND FATS—			
Lard, not including Neutral Lard	,,	5	162
Other Animal Oils, Fats and Greases	,,	597	3,170
Soya Bean Oil	,,	—	—
Cotton Seed Oil	,,	1	11
Coco-nut and Copra Oil (refined)	,,	43	298
Other Edible Oils and Fats	,,	538	4,930
CEREALS—			
Wheat	,,	5	11
Maize	,,	215,043	306,017
Millet	,,	35	40
Other Cereals	,,	145	493
MANUFACTURED PRODUCTS OF CEREALS PRINCIPALLY FOR HUMAN FOOD—			
Meal and Flour of Wheat, Spelt and Meslin	,,	223,364	573,545
Maize Meal and Flour	,,	34,419	48,367
Meal and Flour of other or Mixed Cereals	,,	—	—
Other Manufactured Products of Cereals	,,	205	1,396
EDIBLE NUTS EXCEPT OIL NUTS—			
Coco-nuts	,,	1,398	1,291
Cashew Nuts	,,	1,414	21,143
VEGETABLES, ROOTS AND TUBERS, CHIEFLY USED FOR HUMAN FOOD AND THEIR PREPARATIONS, N.E.S.—			
Potatoes, Fresh (not including Sweet Potatoes)	,,	21,011	18,200
Other Vegetables, Fresh or Simply Prepared in Brine	,,	11,173	17,725
Beans and Peas	,,	42,991	73,804
Pulses	,,	523	1,144
Dhall	,,	5,421	19,499
Other Lentils and Legumes	,,	—	—

[*Continued.*

TABLE B—DOMESTIC EXPORTS, KENYA—1953

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
SUGAR, TEA, COFFEE, ETC—			
Sugar, not Refined, in Bulk	Cwt.	521	1,438
Jaggery	,,	—	—
Coffee, not Roasted	,,	295,795	6,712,730
Tea	,,	59,925	928,276
OILSEEDS, NUTS AND KERNELS—			
Groundnuts	Ton	5	242
Copra	,,	1,810	150,289
Soya Beans	,,	30	1,250
Cotton Seed	,,	—	—
Castor Seed	,,	4,600	266,721
Sunflower Seed	,,	1,796	65,283
Other Oil Seeds, Nuts and Kernels	,,	40	1,137
Beeswax	Cwt.	1,145	21,450
Wattle Bark Extract	,,	441,828	1,544,720
ESSENTIAL VEGETABLE OILS—			
Lemon Grass Oil	Lb.	—	—
Bitter Orange Oil	,,	—	—
Geranium Oil	,,	4,448	17,742
Cedarwood Oil	,,	66,852	9,428
Other Essential Vegetable Oil	,,	14,597	2,944
Rubber, Crude, Plantation and Wild	Centals of 100 lb.	—	—
HIDES AND SKINS—			
Hides of Cattle, Undressed:			
Ground-dried	Cwt.	2,954	29,170
Suspension-dried	,,	55,780	798,325
Wet Salted	,,	11,733	94,106
Wet Salted Calfskins	,,	10	125
Calfskins and Kips:			
Ground-dried	,,	—	—
Suspension-dried	,,	119	1,999
Sheepskins and Lambskins:			
Ground-dried	,,	790	7,982
Suspension-dried	,,	11,405	157,760
Goatskins and Kidskins:			
Ground-dried	,,	874	16,879
Suspension-dried	,,	14,218	407,391
Other Hides and Skins*	—	1,585	55,089
Sheep and Lambs' Wool	Centals of 100 lb.	14,543	257,100
Cotton, Raw	,,	42,231	511,972
Flax	Ton	87	13,333
Sisal	,,	35,334	2,482,469
Mangrove Bark	,,	334	7,834
Wattle Bark	,,	1,805	58,591
Pyrethrum	Cwt.	26,301	395,852
Papain	,,	22	4,089
TOTAL VALUE			£16,718,264

*Includes crocodile skins: Cwt. 1,404, Value £54,044.

TABLE C—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1953

COMMODITIES	Unit	QUANTITIES					VALUE				
		1939	1950	1951	1952	1953	1939	1950	1951	1952	1953
							£	£	£	£	£
Cattle	No.	—	10	14	—	—	—	110	132	—	—
Sheep and Goats	,,	—	—	770	210	415	—	—	1,034	315	608
Bacon and Ham	Cwt.	1,376	16,323	25,545	24,556	19,851	9,080	157,418	253,660	257,556	223,932
Beeswax	,,	1,208	739	399	695	1,145	5,162	13,235	10,144	12,767	21,450
Butter, including Ghee	,,	21,277	11,040	12,698	23,533	12,584	90,659	156,403	202,318	291,123	239,495
Cheese	,,	652	162	222	238	137	2,987	1,712	3,045	3,419	2,175
Hides (Shade-dried)	,,	19,245	63,226	43,890	42,782	55,780	53,372	791,388	957,637	563,613	798,325
Skins (Sheep and Goats (Shade-dried)	No.	337,082	+33,205	+26,629	+19,982	+25,623	18,152	903,008	773,347	389,099	565,151
Hides (Sun-dried)	Cwt.	21,737	10,744	10,653	2,450	2,954	43,444	111,745	208,025	29,611	29,170
Skins (Sheep and Goats) (Sun-dried)	No.	1,014,543	+5,002	2,442	+1,863	+1,664	40,900	88,320	51,757	24,878	24,861
Other Hides and Skins	Cwt.	—	—	10,787	6,563	13,447	—	—	165,171	57,575	151,319
Wool	Centals of 100 lb.	15,114	11,865	14,688	12,024	14,543	56,578	208,661	379,240	240,689	257,100
CROP PRODUCE—											
Coco-nuts and Copra	Ton	215	8	1½	260	1,880	1,561	54	23	1,169	151,580
Coffee	Cwt.	338,125	204,804	198,759	338,441	295,795	800,827	3,549,406	4,096,317	7,123,336	6,712,733
Cotton	Centals of 100 lb.	59,677	18,879	38,855	60,505	42,231	124,021	227,823	986,478	1,098,271	511,972
Sisal	Tons	29,163	35,875	38,825	35,273	35,334	442,434	4,061,168	6,948,160	4,469,588	2,482,469
Flax	,,	16	120	39	42	87	810	15,736	9,350	8,240	13,333
Beans and Peas	Cwt.	123,002	49,902	39,609	151,035	42,991	40,250	89,500	70,935	254,627	73,804
Maize	,,	1,007,125	617,085	406,471	1,365,478	215,043	222,037	720,235	666,850	2,385,264	306,017
Maize Meal and Flour	,,	112,029	83,325	16,162	28,353	34,419	25,450	67,125	15,895	36,801	48,367
Pulses other than Beans	,,	7,756	31,751	16,234	30,611	5,944	2,702	49,244	35,054	64,035	20,643
Wheat	,,	973	30,415	427,232	147,869	5	393	43,184	639,017	281,949	11
Wheat Flour	,,	63,883	125,893	254,746	269,037	223,364	50,655	223,016	515,377	647,735	573,545
Grain other than Maize and Wheat	,,	14,618	4,169	763	6,811	180	4,424	3,116	878	7,223	533
Groundnuts	Ton	402	—	—	6	5	4,442	17	—	403	242
Cashew Nuts	,,	32	140	73	40	71	1,812	22,381	22,349	14,005	21,143
Castor Seed	,,	—	—	—	5,440	4,600	(*a*)	(*a*)	(*a*)	392,463	266,721
Sunflower Seed	,,	477	2,655	3,225	4,446	1,796	3,997	89,634	147,797	183,319	65,283
Coco-nut Oil	Imp. gal.	33,152	—	—	+278	+43	2,346	—	—	2,371	298
Essential Oils	,,	3,660	+1,516	+1,420	+526	+767	4,956	34,540	38,489	35,794	30,114
Groundnut Oils	,,	6,233	+1	+2	—	—	680	8	12	—	—
Sesame Oil	,,	89,944	+31	+27	—	—	10,008	154	181	—	—

[*Continued.*

TABLE C—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1953

COMMODITIES	Unit	QUANTITIES					VALUE				
		1939	1950	1951	1952	1953	1939	1950	1951	1952	1953
CROP PRODUCE—(*Contd.*)							£	£	£	£	£
Potatoes	Cwt.	173,046	43,990	28,390	26,216	21,011	29,199	30,558	23,613	24,353	18,200
Pyrethrum	,,	55,628	22,932	26,473	37,863	26,301	357,170	330,723	357,123	511,971	395,852
Sugar	,,	81,463	880	1,024	860	521	50,308	1,746	2,412	2,800	1,438
Tea	,,	88,627	82,514	82,452	85,579	59,925	501,732	1,333,854	1,397,278	1,315,803	928,276
Wattle Bark	,,	226,716	35,300	42,180	2,077	36,100	72,846	34,544	48,064	61,034	58,591
Wattle Extract	,,	131,312	482,527	444,462	480,488	441,828	91,438	978,945	1,263,848	1,685,912	1,544,720
Passion Fruit Juice ..	Imp. gal.	22,744	14,091	37,034	9,449	—	6,713	7,763	20,477	5,833	
OTHER AGRICULTURAL PRODUCE..	—	—	—	—	—	—	54,446	371,265	409,951	163,509	178,796
TOTAL							3,242,495	14,750,178	20,721,491	22,752,477	16,718,264

+Unit—Cwt.

(*a*) Previous to 1952 the figures for Castor Seed were included in "Other Agricultural Produce".

(*b*) No Linseed and Sesame were exported during 1952 or 1953, and the headings have been omitted from this Table; previous exports are, however, still included in the total shown.

Crops

Barley.—The production of barley from the 1952 crop was 157,586 bags (180 lb.) from 24,624 acres, an average yield of 6.39 bags an acre. The estimate of production from the 1953 crop was 164,134 bags from 30,325 acres, an average yield of 5.41 bags an acre. In 1953 the acreage sown increased by 25 per cent but the average yield was reduced as a result of the very dry weather experienced in the Nakuru and Naivasha areas. There is a growing demand for barley, both for malting and for use as pig food.

Cashew Nuts.—Following a very dry year, the trees benefited from the good rains that fell in the Coastal area in 1953. The production of cashew nuts increased from 323 tons in 1952 to 924 tons in the 1953 season. The price paid to the growers for unprocessed nuts was increased from 12 cents a lb. in 1952 to 20 cents a lb. for the 1953 season. The value of the crop to the producers increased from £4,353 in 1952 to £20,705 in 1953. Exports of decorticated nuts increased from 40 tons valued at £14,005 in 1952 to 71 tons valued at £21,143 in 1953.

Cassava.—This plant stores food in underground roots that are safe from attack by locusts. In 1953, in view of the threat of a locust invasion, officers of the Department made great efforts to increase the area planted to cassava. As a result of these efforts the area under this crop in the Nyanza and Coast Provinces increased from 158,000 acres in 1952 to 188,000 acres in 1953. The production of fresh roots in 1953 was estimated at 417,000 tons, but because of food shortages, practically the whole of this was consumed locally and the only sales to Produce Control were 90 tons of cassava flour from the Coast Province. In the other Provinces there was little increase in the acreage planted but the small production in the Machakos district proved most useful to the Wakamba during a year of drought and famine.

Castor Seed.—The high prices paid for castor seed during the past two years have caused this crop to be planted fairly extensively on terrace banks and field boundaries in the more arid parts of the Kitui and Machakos districts. The area under castor in the Southern Province in 1953 was estimated at 20,000 acres and the yield was estimated at 3,000 tons. In addition, considerable quantities of seed were collected from the numerous self-sown plants in the Coast and Central Provinces. Exports of castor seed decreased from 5,440 tons valued at £392,463 in 1952 to 4,600 tons valued at £266,721 in 1953. The reason for this decrease was a reduction in yield caused by the drought in the Southern Province.

Chillies.—Chillies, especially *Capsicum annuum,* are grown fairly extensively on the lower slopes of the Teita Hills where they form the main cash crop of the Voi district of the Coast Province. The crop planted in the short rains of 1952 produced a poor yield but the yield from the larger area planted in the long rains of 1953 was satisfactory. The price paid by local traders recovered to Sh. 1 per lb. Production increased from 299 tons valued at £30,000 in 1952 to 322 tons valued at £36,000 in 1953.

Coffee.—The area planted to coffee by Europeans increased slightly from 60,500 acres in 1952 to 60,700 acres in 1953. Production decreased from the post-war record crop of 16,040 tons in 1952 to 12,190 tons in 1953. The corresponding decrease in the average yield per acre was from 5.3 to 4 cwt. The reduction in the 1953 crop was due to drought. In the main coffee-growing areas the short rains of 1952 were a virtual failure and the long rains of 1953 were very poor, the total rainfall for 1953 being 27 per cent below the average. Nevertheless coffee easily retained its place as Kenya's most valuable export crop and the mean export value per ton for all grades increased from £421 in 1952 to £453 in 1953. The quantity of coffee exported decreased from 16,922 tons valued at £7,123,360 in 1952 to 14,970 tons valued at £6,712,730 in 1953.

Coffee growing by Africans continued to expand in a very satisfactory manner. The number of licensed African coffee growers increased from 11,864 in 1952 to 15,019 in 1953. Over the same period the area was enlarged from 3,038 to 3,867 acres, of which only 752 acres are yet in bearing. About half the growers and more than half of the acreage are in the Meru district of the Central Province. There are smaller areas in the other districts of the Central Province, at Kisii and Kimilili in the Nyanza Province and in the Teita Hills of the Coast Province. Coffee growing in all of these areas is supervised by members of the staff of the Department of Agriculture. High standards of cultivation and processing are maintained and these produce good yields of high quality coffee.

The cup presented by the Coffee Board for the best African coffee was won by the Chogoria Co-operative Society, of Meru, with an average basic scale value of 106.18 on a crop of 72 tons. This marking was higher than any European estate except the Coffee Research Station, which won the Gilliatt Cup for European farmers. The same Society had an out-turn for a 100 bags of their 1953–54 crop which must surely be a record for the Colony: 75 per cent A. and P.B. Grade classed I and 18.55 per cent B Grade classed IV, leaving only 6.11 per cent in all lower grades.

In the Kisii highlands the acreage reached 756, of which the 281 acres in bearing produced 57 tons of parchment coffee and 46 tons of "buni". The high proportion of "buni" was due to a lack of factory facilities. Of the parchment produced, 23.75 per cent was in the first three classes, making Kisii coffee second only to that of Meru district in quality. The Kiomooncha Society of Kisii won the first prize for parchment coffee at the Royal Agricultural Society of Kenya's Nairobi Show in October.

In the Teita Hills in the Coast Province the area under coffee was increased from 42 to 76 acres. A co-operative society was formed and a pulper was installed and operated.

Copra.—The area under coconuts at the Coast was estimated at 50,000 acres. During most of 1953 the palms were still recovering from the effects of the drought of the previous year and consequently yields were poor. Following the good rains of 1953 there are indications that a satisfactory crop will be harvested in 1954. Production during 1953 was estimated at 15,000,000 nuts, most of which were consumed locally. At the end of the year the local price of coconuts was Sh. 22 per hundred and of copra Sh. 23 per frasila. The control of copra was removed at the end of June. Exports of copra during 1953 amounted to 1,810 tons valued at £150,289.

A Cococnut Improvement Scheme was started during the year with £3,000 made available from the Coast Cotton Sales Fund. Under this scheme, 27,000 selected palms were raised in nurseries for issue to coconut growers during the 1954 long rains. The work of destroying rhinoceros beetles and the destruction of dead and dying trees under the Coconut Preservation Ordinance proceeded satisfactorily.

Cotton.—The final production figures for the 1952-planted crop, which was ginned early in 1953, were:—

	Bales of Lint of 400 *lb. net*		
	A.R.	*B.R.*	*Total*
Nyanza Province ..	7,504	447	7,951
Coast Province ..	1,165	295	1,460
Kenya Total ..	8,669	742	9,411

In the Nyanza Province the 1953–54 crop was again a poor one. The estimate of the area planted was 64,000 acres, but owing to the late beginning of the long rains, planting of food crops was delayed and this led to the very late planting of cotton. The growth of the crop was stunted and the yield was reduced seriously by drought as well as by attacks of American Bollworm and Lygus. Black-arm damage was less severe because all seed issued for sowing in 1953 was treated with Perenox. Buying of the 1953–54 crop started in mid-December, the prices to the grower for seed cotton being 50 cents per lb. for "A" quality and 17 cents per lb. for "B" quality. The crop is estimated to produce a total of 9,906 bales made up of 9,035 bales of A.R. and 871 bales of B.R.

In the Coast Province the 1953–54 crop was one of its best on record. The area planted was 23,000 acres, weather conditions were favourable, and the quality improved as the result of more strict inspection at the buying posts. The prices paid to the growers were the same as those paid in Nyanza Province, and the crop is estimated to produce a total of 5,300 bales.

All ginneries were inspected during the year by a Ginnery Inspector, kindly loaned by the Director of Agriculture, Tanganyika, and the many improvements effected in the ginning plant should result in the production of a higher quality lint. As in former years the Nyanza crop was marketed through the Uganda Lint Marketing Board and the Coast crop was sold by tender. Exports of raw cotton decreased from 60,505 centals valued at £1,098,271 in 1952 to 42,231 centals valued at £511,972 in 1953.

Essential Oils.—Exports of geranium oil decreased from 60 cwt. valued at £26,166 in 1952 to 40 cwt. valued at £17,742 in 1953. Exports of other essential vegetable oils in 1953 amounted to 130 cwt. valued at £2,944.

Flax.—Exports of this crop increased from 42 tons valued at £8,240 in 1952 to 87 tons valued at £13,333 in 1953.

Groundnuts.—The main production of this crop comes from the Lakeshore area of the South Nyanza district. Sales of groundnuts to the Produce Control organization decreased from 866 tons valued at £24,251 in 1952 to 627 tons valued at £21,654 in 1953. The reduction in sales was due to a shortage of other foodstuffs due to a drought in the producing area. The quantity of groundnut oil delivered to the Control increased from 17,191 tins (36 lb.) in 1952 to 19,635 tins in 1953.

Kapok.—Production increased from 61,776 lb. valued at £1,600 in 1952 to 99,000 lb. valued at £2,970 in 1953. Most of the crop was bought by Malindi Ginneries, Ltd., at a price to the grower of 60 cents per lb.

Linseed.—Actual production from the 1952 crop was 8,430 bags (200 lb.) from 3,907 acres, the average yield being 2.15 bags an acre. The estimate of production from the 1953 crop was 8,351 bags from 3,665 acres, giving an average yield of 2.27 bags an acre.

Maize.—Actual production from the 1952 crop in the non-native areas was 928,152 bags (200 lb.) from 140,510 acres, an average yield of 6.60 bags an acre. The estimate of production from the 1953 crop was 1,093,038 bags from 163,854 acres, giving an average yield of 6.67 bags an acre. Most of the increased area was planted in Uasin Gishu, but there was a considerable increase in the maize area in the Trans Nzoia and a smaller increase in the Nakuru district.

In the African areas the estimate of the area planted for the long rains crop was 1,575,000 acres. Yields were good in the Central and Coast Provinces, poor over most of Nyanza except for the North Nyanza district, and negligible in the Southern Province. Most of the African production is consumed by the growers. The only province with an appreciable surplus was Nyanza, where, due mainly to good yields in the North Nyanza district, the surplus is expected to be over 90,000 tons.

Deliveries to the Maize Control during the past two crop years ending 31st July were:—

	Bags of 200 lb. net	
	1951/52	*1952/53*
Non-African areas	751,060	726,097
African areas	1,091,733	744,739
Total	1,842,813	1,470,836

From the 1953 crop a larger surplus is expected from the European areas in addition to the 90,000 tons from Nyanza. At the end of 1953 the existing stores were nearly full and it was anticipated that about 20,000 tons of maize would have to be exported in 1954. Even so, production is not much in excess of Kenya's requirements if adequate reserves against lean years are to be maintained. The problem is not one of over-production of maize, but of inadequate storage facilities, and additional stores are to be built in 1954.

The guaranteed free on rail price for Grade II maize from the 1953 crop was Sh. 38/72 per 200 lb. without bag.

Oats.—The actual production of oats in 1952 was 109,465 bags (150 lb.) from 17,570 acres, an average yield of 6.23 bags an acre. The estimate of production in 1953 was 147,549 bags from 23,808 acres giving an average yield of 6.11 bags an acre. The increased area means an increase in the production of oats for stock feed. Of the total production about 70 per cent is retained on the farms and the remainder is sold for milling.

Other Cereals.—The drought-resistant cereals such as Sorghum and Finger, Bulrush and Foxtail Millets, are grown on a considerable scale in the African areas, but most of the production is consumed by the growers. In the crop year ending 31st July, 1953, only 31,876 bags of these cereals were sold to the Produce Control and of this total 21,444 bags (200 lb.) were finger millet (*wimbi*) from Nyanza Province.

Passion Fruit.—The acreage under this crop in the Sotik area at the end of 1952 was 503 acres. There was little new planting in 1953, but higher prices, amounting to Sh. 3 to Sh. 4 per gallon of juice, may result in a revival in this small industry if a means can be found to overcome the losses caused by brown spot and "woodiness" disease.

Potatoes.—In the Central Province yields were heavy in the Meru district and moderate elsewhere. In the Nyanza Province fair crops were harvested in the Kericho district. Owing to the dry conditions attacks of blight were less severe than usual and plantings of the blight-resistant variety Dutch Robyjin are increasing. Recorded sales from the African areas showed a large increase, from 5,285 tons value at £51,763 in 1952 to 13,358 tons valued at £99,755 in 1953. European farmers grew only sufficient potatoes for their own consumption. The large surplus production by Kikuyu forest squatters will be lost for the next year or two because of their repatriation to the Central Province and because of Emergency regulations restricting cultivation on the forest fringe. Exports decreased slightly from 1,110 tons valued at £24,353 in 1952 to 1,050 tons valued at £18,200 in 1953.

In the African areas there is a large production of sweet potatoes for home consumption.

Pulses.—Bean crops were about average in the Nyanza and Central Provinces, but in the Southern Province the drought caused these crops to fail. Cowpeas were grown on a large scale and there is a demand for the leaves of this crop for consumption as a green vegetable. The production of grams is increasing in

popularity because this crop can stand some drought and it produces a comparatively high cash return for little labour.

The recorded quantities of pulses of all kinds marketed from the African areas decreased from 14,534 tons valued at £325,324 in 1952 to 10,894 tons valued at £308,624 in 1953. Deliveries to Produce Control in the crop year ending 31st July were:—

	1950–51	*1952–53*
	Tons	*Tons*
Beans, various	11,070	9,238
Field Peas	675	195
Cowpeas, grams and others ..	5,480	4,006
Total	17,225	13,439

Exports of pulses, mainly beans, peas and dhall, decreased markedly from 9,082 tons valued at £318,662 in 1952 to 2,447 tons valued at £94,447 in 1953.

Pyrethrum.—The area licensed in 1953 was 23,807 acres compared with 22,941 acres in 1952. Production of dried flowers decreased from 2,451 tons in 1952 to 2,032 tons in 1953. Exports decreased from 1,893 tons valued at £511,971 in 1952 to 1,315 tons valued at £395,852 in 1953. The payout to growers per lb. of flowers delivered, on a basis of 1.5 per cent pyrethrins, was reduced from Sh. 2/58 in 1952 to Sh. 2/47 in 1953.

The increase in the production of pyrethrum by Africans in the Central Province is shown below:—

	1952	*1953*
Acreage	799	1,086
Number of growers	388	586
Sales of flowers (tons)	83	110
Value	£12,765	£29,680

Most of the production comes from the Kiambu district, where marketing through co-operative societies is now being organized. There is a small production in the Nyeri district and in the Kisii Highlands in South Nyanza.

Rice.—The area under rice in Nyana Province increased from 5,000 acres in 1952 to 6,000 acres in 1953. Most of the production came from 2,300 acres of transplanted and irrigated rice on the Kano Plains in the Central Nyanza district and the rest from swampy areas in the North Nyanza district. In the irrigated areas a fair yield was obtained but in the rain-fed areas the crop was a failure. The quantity of *padi* marketed in Nyanza Province increased from 1,561 tons valued at £36,160 in 1952 to 1,943 tons valued at £43,912 in 1953. In the crop year ending 31st July, 1953, the quantity of clean rice milled in Nyanza Province and delivered to the Produce Control was 1,554 tons.

In the Coast Province the area planted decreased from 3,595 acres in 1952 to 2,640 acres in 1953. The reduction was due to poor floods in the lower reaches of the Tana River and to drought in the normally rain-fed areas. The main production came from the irrigated area in the Umba Valley where 1,000 tons of *padi* were harvested from 700 acres. The quantity of *padi* marketed in the Coast Province increased from 214 tons valued at £4,490 in 1952 to 280 tons valued at £6,272 in 1953.

Sisal.—The area under estate sisal increased slightly from 247,583 acres in 1952 to 249,519 acres in 1953. The mature area cut increased from 112,025 acres in 1952 to 120,587 acres in 1953. Production increased from 35,938 tons in 1952 to 37,732 tons in 1953, of which approximately 50 per cent came from the Central area, 25 per cent from the Coast and the remainder from the Nakuru and Trans

Nzoia areas. Exports increased slightly from 35,273 tons in 1952 to 35,334 tons in 1953, but their value fell from £4,469,588 in 1952 to £2,482,470 in 1953. The mean export value per ton fell from £178 in 1951 to £126 in 1952 and to £70 in 1953. In spite of the reduction of nearly £2,000,000 in the value of sisal exports in 1953, sisal retained its position as Kenya's second export crop.

The demand for African-grown sisal leaf was negligible because the reduced price of fibre could not carry the heavy costs involved in transporting the leaf to the factories. Nevertheless, one company in Nyanza Province continued to buy leaf throughout the year. The Machakos African Sisal Scheme, under which washed fibre is purchased, brushed and baled, made good progress. The new factory at Machakos started to operate in March, production rose to 60 tons a month in October and was expected to reach 100 tons a month early in 1954. Total production under the Scheme in 1953 was 521 tons and the amount paid out to the producers was £20,000. Government assisted the project by a loan of £10,000 for the purchase of additional fibre as a means of effecting famine relief in the Machakos area.

Sugar.—The area under sugarcane in Nyanza Province was 13,637 acres. The production of white sugar by the Miwani factory decreased from 13,014 tons in 1952 to 10,578 tons in 1953. The production of jaggery on the Indian farms decreased from 1,810 tons in 1952 to 1,523 tons in 1953. In both cases the decrease was due to a reduction in the yield and sucrose-content of the cane caused by the severe drought in the first half of the year. The production of sugarcane by Africans is expanding. The first crop was harvested in 1953 when African growers sold 220 tons of cane to the Miwani factory. A start in the development of sugarcane growing by Africans has been made in the North and South Nyanza districts, trials with jaggery production having been made in the former district.

In the Coast Province the area under cane at Ramisi increased slightly from 7,000 acres in 1952 to 7,200 acres in 1953. The production of white sugar by the Ramisi factory in 1953 was 6,025 tons.

Sunflower.—Actual production from the 1952 crop was 55,588 bags (100 lb.) from 19,751 acres, an average yield of 2.81 bags an acre. Of this production, 14,919 bags were retained on farms. The estimate of production from the 1953 crop was 61,806 bags from 15,595 acres, giving an average yield of 3.96 bags an acre. The reduction in area was due to the comparatively poor cash return per acre that can be obtained from sunflower seed. The use of sunflower heads for stock feed is increasing. Exports of sunflower seed fell from 4,446 tons valued at £183,319 in 1952 to 1,796 tons valued at £65,283 in 1953.

Tea.—The area under tea increased from 21,021 acres in 1952 to 21,753 acres in 1953. Production decreased from 14,788,741 lb. in 1952 to 12,927,563 lb. in 1953. The decrease was due to the severe drought experienced throughout the tea-growing areas during the first half of 1953. Of the 1953 production 6,089,097 lb. or 47 per cent was set aside for export and 6,838,466 lb. or 53 per cent retained for local consumption. Actual exports decreased from 9,584,848 lb. valued at £1,315,803 in 1952 to 6,711,600 lb. valued at £928,276 in 1953. Approximately half of the 1953 exports went to the United Kingdom. On the London market there was a reversal of the 1952 trend and prices of common tea reached the highest levels ever recorded, the average price for 1953 being Sh. 3/5d. per lb. The wholesale price of tea sold on the East African markets was increased to provide a return to the producers of Sh. 2/78 per lb. ex factory.

Little progress could be made with the scheme for tea growing by Africans because the area concerned in the Nyeri district was closed for security reasons. The area planted increased a little to 37 acres and 2,000,000 seedlings were raised in the nursery. In the Embu district 2,000 lb. of tea seed were set in a nursery.

Tobacco.—Flue-cured tobacco continued to be produced on a small scale in the Fort Hall, Embu and Kitui districts by the East African Tobacco Company from green leaf purchased by them from African growers who had obtained their tobacco seedlings from the Company's nurseries. In the Fort Hall and Embu districts the 1952 short rains crop was poor and the 1953 long rains crop was good; in the Kitui district both crops were poor. Purchases of green leaf increased slightly from 1,020,027 lb. valued at £2,825 in 1952 to 1,167,832 lb. valued at £4,394 in 1953. Expansion was not rapid because other crops such as snuff tobacco or gram yield a higher cash return to the grower.

The production of snuff tobacco is a lucrative business in the Central Province especially in Meru district, in the Machakos district of the Southern Province and in the Lamu and Kwale districts of the Coast Province. Accurate records of production are not available because most of the crop is sold direct to itinerant traders. In the Central Province an average total yield of 300 lb. of cured leaf per acre was obtained from the two crops and the snuff was sold at Sh. 6/40 per lb. Recorded sales in 1953 amounted to 134 tons of cured leaf valued at £12,714.

Vegetables, Fruit and Flowers.—In the Central Province the estimated area under African-grown pineapples in the Kiambu district again increased from 2,750 acres in 1952 to 3,250 acres in 1953. Deliveries of pineapples to the canning factory at Thika increased, but total sales of this fruit decreased from 3,500 tons valued at £40,000 in 1952 to 3,000 tons valued at £37,500 in 1953. African flower-growers in the Kiambu district continued to sell their production in Nairobi. From the Fort Hall district 42 tons of oranges and lemons were sold to a manufacturer of fruit squashes. The records show that the total sales of vegetables and fruit from the Central Province decreased from 13,838 tons valued at £146,604 in 1952 to £7,349 tons valued at £87,409 in 1953. Although there was some reduction in sales due to difficulties connected with the Emergency, it was not as large as these records suggest, because the 1952 figures include sales from the Machakos and Kitui districts which now form part of the new Southern Province.

In the Southern Province great efforts were made by African farmers in the Machakos district to increase their production of vegetables and fruit, much of which is now grown under irrigation on well-manured bench terraces, and marketed through African co-operative societies and the Kenya Horticultural Union. That the 1953 crops were not up to expectations was due to the severe drought experienced during the first nine months of the year. The most profitable crop was strawberries, and although production fell from 111 tons in 1952 to 82 tons in 1953, the 1953 crop still brought in a revenue of £28,221 to the growers. Exports of other horticultural produce from the Province, mainly to the Nairobi market, included 920 tons of green vegetables, 111 tons of onions and 87 tons of other fruit. In addition, farmers in the Kitui district harvested a good crop of mangoes, of which they marketed 125 tons. The total recorded sales of vegetables and fruit from the Southern Province in 1953 amounted to 1,325 tons valued at £48,363.

The Coast Province enjoyed exceptionally good rains and heavy crops of vegetables and fruit were harvested. The principal African vegetable-producing area was the Teita Hills, sales from which, mainly through the co-operative society, increased from 636 tons in 1952 to 954 tons in 1953. A somewhat wider variety of vegetables was on sale and all found a ready market. Increasing quantities of vegetables were grown under irrigation by market gardeners in the vicinity of Mombasa Island. Of the fruits, the crops of bananas, citrus and pineapples were all good, but the mango crop was poor due to excessive rain at flowering time. There were increased planting of bananas on the coastal strip; and in the Teita Hills, where bananas have become the staple diet of the people, the area under this crop increased to 10,000 acres. Citrus fruits were plentiful but the quality was poor; at one time imports of better oranges from Zanzibar reduced the price

of the local product from Sh. 8 to Sh. 3 per 100. The pineapple crop was an excellent one and the canning factory worked to full capacity throughout the harvest season. Total recorded sales of vegetables and fruit in the Coast Province increased from 9,528 tons valued at £129,300 in 1952 to 13,339 tons valued at £105,608 in 1953.

Wattle.—Despite the Emergency, the production of wattle bark in the Central Province, the principal wattle-growing area in the Colony, increased from 32,507 tons valued at £466,896 in 1952 to 37,511 tons valued at £512,169 in 1953. Much of this increase was due to the felling, as a security measure, of a considerable acreage of wattle along the road-sides. Sales of dry bark from the other African areas in 1953 amounted to only 1,385 tons, made up as follows: Kisii 69 tons, Kericho 389 tons, Nandi 286 tons, Machakos 413 tons and Teita 228 tons. The area under wattle on European farms in 1953 was 75,200 acres, of which 64,771 acres were in the Uasin Gishu district.

The following statistics were supplied by the Kenya Wattle Manufacturers' Association:—

	1952 Tons	*1953* Tons
Purchased from Africans—		
Dry Bark, F.A.Q.	31,631	35,106
Dry Bark, U.G.	3,498	3,423
Green Bark, F.A.Q.	2,689	3,863
Purchased from Europeans—		
Dry Bark, F.A.Q.	8,241	10,505
Dry Bark, U.G.	201	348
Green Bark, F.A.Q.	5,007	3,269
Total production of extract ..	24,463	27,230
Total exports and local sales of extract	24,767	22,828
Exportable value	£1,758,438	£1,597,960

Actual exports of wattle extract decreased from 24,024 tons valued at £1,685,912 in 1952 to 22,091 tons valued at £1,544,720 in 1953. Exports of wattle bark decreased from 2,077 tons valued at £61,034 in 1952 to 1,805 tons valued at £58,591 in 1953.

Wheat.—The following is a comparison of the actual production from the 1952-sown crop with the final estimate of production from the 1953-sown crop:—

	1952–53 (Actual)	*1953–54 (Estimate)*
Area (acres)	284,031	289,029
Total production (bags of 200 lb. net)	1,269,107	1,316,207
Average yield (bags per acre) ..	4.46	4.55
Retained on farms (bags) ..	105,659	115,611
Available for milling (bags) ..	1,163,448	1,200,596

Most of the small increase in acreage was sown in the Uasin Gishu and Naivasha districts, already the largest wheat-producing areas. At altitudes above 7,000 ft. yields were higher than usual, but on the floor of the Rift Valley in areas such as Rongai and Njoro yields were reduced by the drought to around two bags an acre. The guaranteed free on rail price for Grade I wheat from the 1953-sown crop was Sh. 52/50 per 200 lb. naked, an increase of 44 cents on the 1952 price. The consumption of flour in East Africa is increasing steadily and as the result of three consecutive unfavourable seasons wheat production was barely sufficient to meet local requirements, and no wheat was exported in 1953. Exports of wheat flour decreased from £13,452 tons valued at £647,735 in 1952 to 11,168 tons valued at £573,545 in 1953.

Livestock Products

Bacon and Lard.—There was a further decrease in the deliveries of all types of pigs to the factories and to butchers:—

	1952	*1953*
Baconers	43,535	41,768
Porkers	13,483	11,768
Larders	3,990	3,937
	61,008	57,473

Exports of bacon and ham decreased from 24,556 cwt. valued at £257,556 in 1952 to 19,851 cwt. valued at £223,932 in 1953.

Butter.—Creamery production decreased from 9,137,669 lb. in 1952 to 7,411,313 lb. in 1953, in which year local sales amounted to 6,174,826 lb. Exports decreased from 23,533 cwt. valued at £391,123 in 1952 to 12,584 cwt. valued at £238,495 in 1953. The average pay-out for Grade I butterfat in 1953 was Sh. 3 per lb.

Cheese.—The production of cheese by the creameries decreased from 591,900 lb. in 1952 to 275,476 lb. in 1953. Exports fell from 238 cwt. valued at £3,419 in 1952 to 137 cwt. valued at £2,175 in 1953.

Eggs.—Sales of eggs from the African areas increased from 59,282 gross valued at £49,030 in 1952 to 61,645 gross valued at £62,364 in 1953. Exports of eggs in 1953 were 14,176 gross valued at £32,744.

Poultry.—Sales of poultry from the African areas increased from 295,277 head valued at £26,200 in 1952 to 355,261 head valued at £33,379 in 1953. Of the total sales, 275,613 head came from the Southern Province.

Hides and Skins.—Exports of hides and skins increased from 73,817 cwt. valued at £1,069,776 in 1952 to 99,468 cwt. valued at £1,568,826 in 1953. Details of exports in 1953 were:—

	Cwt.	*Value* £
Cattle hides (shade-dried)	55,780	798,325
Cattle hides (sun-dried)	2,954	29,170
Cattle hides (wet-salted)	11,743	94,231
Calfskins and kips (shade-dried) ..	119	1,999
Sheepskins and lambskins (shade-dried)	11,405	157,760
Sheepskins and lambskins (sun-dried)	790	7,982
Goatskins and kidskins (shade-dried)..	14,218	407,391
Goatskins and kidskins (sun-dried) ..	874	16,879
Other hides and skins	1,585	55,089
	99,468	£1,568,826

Slaughter Stock.—The following are comparative figures of purchases by the Kenya Meat Commission:—

	1952	*1953*
European-owned cattle and calves ..	29,635	41,573
African cattle	16,084	19,065
European-owned sheep and goats	24,525	41,571
African sheep and goats	86,025	86,664

Wool.—Exports of wool increased from 12,024 centals (100 lb.) valued at £240,689 in 1952 to 14,543 centals valued at £257,100 in 1953.

TABLE D—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS—1953—(PARTLY ESTIMATED)

PRODUCE	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			£		£		£		£
Beeswax	36 lb.	—	—	111	499	145	2,092	—	—
Cashew Nuts	Cwt.	—	—	—	—	—	—	18,483	20,705
Cassava	Tons	—	—	—	—	—	—	790	8,844
Chillies	,,	—	—	—	—	—	—	322	36,000
Coffee (parchment)	Lb.	—	} 18,611	452,481	91,710	—	—	—	—
Coffee (buni)	,,	—		501,246	36,632	—	—	—	—
Copra	110 lb.	—	—	—	—	—	—	1,955	108,153†
Coriander	180 lb.	—	—	—	—	2,139	2,887	—	—
Castor Seed	Tons	—	—	No figures	No figures	1,970	68,487	140	4,700
Cotton (Seed Cotton)	Lb.	10,667,280	246,832	—	—	—	—	1,885,760	40,025
Eggs	Number	3,150,256	21,256	4,354,352	33,011	1,372,279	8,097	—	—
Charcoal, Fuel and Poles	—	—	—	—	62,747	—	—	—	—
Ghee	36 lb.	25,550	101,576	—	—	—	—	—	—
Groundnuts	180 lb.	7,777	21,654	—	—	—	—	—	—
Hides	36 lb.	68,644*	60,311	20,182	70,584	73,459	60,704†	—	—
Kapok	Lb.	—	—	—	—	—	—	99,000	2,970
Maize and Maize Meal	200 lb.	570,494	835,414	11,324	17,310	—	—	2,543	4,069
Millets and Sorghum	,,	29,830	39,642	4,885	5,373	216	404	—	—
Miraa (*Catha edulis*)	Tundus	—	—	40,000	35,000	—	—	—	—
Potatoes (English)	180 lb.	8,956	6,717	156,683	93,038	—	—	—	—
Poultry	Head	15,258	3,051	64,390	12,002	275,613	18,326	—	—
Pulses	200 lb.	5,157	10,201	101,941	195,907	4,302	12,732	10,613	89,784
Pyrethrum	Lb.	—	190	246,443	29,680	—	—	—	—

[*Continued.*

TABLE D—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS—1953—(PARTLY ESTIMATED)

PRODUCE	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Rice (Paddy)	150 lb.	27,208	43,912	—	—	—	—	4,181	6,272
Sesame	180 lb.	823	2,422	—	—	—	—	524	1,556
Sisal Leaf	Tons	16,006	6,460	No sale	No sale	—	—	—	—
Sisal Fibre	,,	—	—	—	—	521	20,000	—	—
Skins	Score	(*See* under	Hides)	15,221	47,167	20,349	68,930†	—	—
Tobacco, green leaf	Lb.	—	—	1,088,359	3,063	—	—	—	—
Tobacco, Native cured ..	Tons	—	—	75	5,994	32	1,331	60	6,720
Vegetable, flowers and fruits..	,,	No figures	No figures	7,336	97,454	1,430	48,363	13,339	105,608
Wattle Bark	,,	358	5,537	37,511	512,169	413	5,725	228	2,800
Wheat	200 lb.	1,883	3,889	81	147	—	—	—	—
TOTAL VALUE ..£			1,427,675		1,349,487		318,078		438,206

*Number, including skins. †Figures incomplete.

The total value of the produce shown in the above Table was £3,533,446. The corresponding figure for 1952 was £3,342,000.

PART II—RESEARCH AND SPECIALIST SERVICES

Expansion of the research facilities of the Department, financed by a Colonial Development and Welfare Fund Grant, continued during the year but, once again, progress was not as expeditious as had been hoped. The building work on the new central laboratories in Nairobi was finished, but most of the internal installations and fittings remain to be done and the laboratories will not be ready for occupation before June, 1954. Major developments on the new experimental stations at Eldoret, Embu and Matuga were completed and, as in 1952, a full programme of field experiments was carried out at all three. A start was made on building, clearing and fencing on the new station at Sotik, but protracted negotiations for land for the main Nyanza Province station at Kakamega continued throughout the year and were not successfully concluded until early in 1954. Extensions to the coffee and fruit research stations, including a new factory at the former, were completed. At the Grassland Research Station, Kitale, offices, chemical and field laboratories, and five European houses were built and approximately 400 acres of the land were in use for experimental work. The money provided by the Colonial Development and Welfare Fund grant for pasture research is now exhausted and further developments at this station and at the sub-station at Molo, together with provision for work in the drier areas, must await the allocation of additional funds for which application was made some time ago.

The staff position again improved; 34 out of 36 research officer posts are now filled and there are only five vacancies in a total European establishment of 91. However, in common with the vast majority of activities in Kenya, the research services of the Department suffered to some extent as a result of *Mau Mau,* as all sections and stations had officers on full or part-time Emergency duties. In particular, four out of six of the Assistant Agricultural Officers of the Grassland Research team were on full-time duty with the Security Forces for a considerable part of the year; experimental work in Machakos district was crippled by the call-up and subsequent death of the Agricultural Officer (Experiments), Mr. V. R. S. Beckley, who could not be replaced; several sub-stations in the Central Province had to be abandoned owing to danger to personnel, and European and African staff responsible for experimental work in this Province carried on with remarkable efficiency in the face of very trying circumstances.

General Husbandry

African Areas

The broad objective of work in the African areas is to obtain information which will enable sound farming systems to be evolved for the varying conditions of different parts of the Colony. We still lack adequate detailed knowledge of the conditions themselves and work is in progress on the production of approximate soil and land utilization maps, vegetation surveys, and studies of the distribution and reliability of rainfall. These are obviously long-term projects and relatively little progress has been made so far, but such basic information, together with data on population densities and other social and economic factors, is essential for properly planned land utilization. Field experimentation has continued on a variety of the components of the farming system, including ley establishment and management, the use of fertilizers and manures, cultivation methods, production of fodder crops for dry season feeding and improved varieties of food and cash crops. Comprehensive fertility maintenance experiments have not yet been started in areas suitable for ley farming but trials of varying periods of rest and types of resting covers have begun at the Coast.

Fertilizer trials have again confirmed that there are marked responses to phosphate over considerable parts of all Provinces and, in a number of places, responses to nitrogen have also been demonstrated. In parts of North and Central

Nyanza fertilizer experiments over the past six years have clearly demonstrated an economic response to phosphate and a drive is now being made to encourage the use of this fertilizer. Elsewhere the number of experiments has been limited but the responses obtained indicate a need to step up the investigation into fertilizer requirements in these areas. Every endeavour will be made to do this by, firstly, approximate soil survey to indicate major soil types; secondly, a scatter of simple exploratory trials to show where marked responses occur; thirdly, more accurate experiments at carefully selected sites to determine optimum rates, methods of application and types of fertilizer; and, fourthly, long-term trials to observe residual or cumulative effects in both responding and non-responding areas. Additional staff is needed if progress in this large-scale investigation is to be made at a reasonable rate.

A number of factorial experiments on the effect of tie-ridging, mulching with grass and the application of farmyard manure on the yields of arable crops have now been running for two years. The use of the 3 ft. tied ridge has not so far proved markedly beneficial: in many cases it has slightly increased yields but in others it has caused a reduction by adversely affecting germination and stand, while certain small grain crops, e.g. *Eleusine coracana* (Wimbi) always do better on the flat. Five-foot tied ridges have not been better than the 3 ft. ridges. It seems likely that, provided consolidation is effected to eliminate poor germination, tie ridging will prove in some degree beneficial to most crops and, of course, it has a great advantage in checking erosion and reducing the proportion of the land put out of cultivation in the form of terraces or grass strips. Information on mulching is also not yet conclusive but it is certainly beneficial in the drier areas. As carrying considerable quantities of grass on to his farm is not likely to commend itself to the African peasant, the next step must be to determine the effect of the smaller mulch which could be provided by crop residues. The application of five or ten tons per acre of farmyard manure has proved universally beneficial and in some places a marked residual effect has been apparent up to the fourth crop from a single dressing at the lower rate put on two years before. As mentioned in last year's report, long-term trials have been started to study the optimum rate and method of application of farmyard manure, its residual effects, the relative responses of different crops, and its interaction with phosphate.

In the field of crop improvement it must again be recorded that progress towards obtaining good short-term sorghum and maize varieties for the drier areas has not been satisfactory, and it is not likely to be until staff is available to undertake breeding work. A number of cassava varieties ex Amani stood up well in disease resistance tests at Matuga and are now showing promise in yield trials. The breakdown in resistance of some of these varieties under conditions of massive infection on the nearby Gombato Estate does not, in all probability, mean that these varieties are unpromising for general use at the Coast, as they could be introduced in such a way as to reduce the degree of infection to which they are normally subjected to a level which their resistance could withstand. Rice variety trials in Nyanza have indicated that Pishori, a variety very popular in India and of excellent milling quality, may be better than the standard variety, Sindano, which has hitherto proved to be at least as good as all other varieties tested. Variety trials were also carried out in various places with groundnuts, beans, *Eleusine*, castor and *Hibiscus cannabinus*.

Work on cotton was continued in Nyanza Province by an officer of the Empire Cotton Growing Corporation posted to Kisumu and included breeding and variety, cultivation, spacing, time of planting, seed dressing and spraying trials. Conclusive results are naturally not available after only two seasons' work but the evidence so far suggests that early planting and ridging, and possibly wider spacing, will give better yields; all of which are in conflict with the normal native

practice of planting cotton on the flat after food crops have been planted and leaving several plants at each hole. Cotton variety and inter-planting trials were also carried out at four sites at the Coast.

While our technical knowledge in respect of all areas still leaves much to be desired, it is in the drier areas, and in certain areas of special conditions, where we are most lacking in knowledge. Since these areas include most of the land available to accommodate surplus population from other places it is particularly important that we should find out how best to use them, and two examples of the limited progress made on these problems may be mentioned.

The large Makueni Settlement Area in Machakos district is typical of much of the drier, uninhabited or sparsely populated, country which becomes available for settlement with the control of tsetse fly. With light soils of indifferent fertility and an unreliable rainfall averaging 25 to 30 inches per annum and falling in two rainy seasons per year, it is clear that arable cropping is a chancy business and that emphasis should be on stock ranching. Cultivation, at any rate to the extent required to produce the settlers' food, is, however, considered necessary, and consequently experimental work is aiming at finding out how to grow food and fodder crops with the best chance of success and how to retire the arable land under leys. For arable crop production our experiments so far indicate that tie-ridging exerts a consistent, although non-significant, beneficial effect, that mulching with grass gives marked yield increases, that there is a big response to phosphate, and that moderate dressings of five tons of farmyard manure will raise yields by an average of over 50 per cent for several seasons. Despite these facts, the uncertainty of the rainfall is likely to result in seasons of crop failure occurring fairly frequently. Maize, sorghum and bulrush millet have given satisfactory fodder yields and they respond markedly to farmyard manure or phosphate. A satisfactory legume for a fodder mixture has not yet been found but a spreading variety of cowpea has given fair results. Unless the season is particularly unfavourable, leys can be satisfactorily established with Star grass, *Panicum makarikariensis* or *Cenchrus ciliaris*: phosphate and farmyard manure assist establishment and in one trial the combination of ridging and farmyard manure was particularly helpful. The persistence and productivity of these leys has not yet been measured and it is possible that better species will be found. Experimental work on the management of permanent grassland, which is likely to be a most important factor in the success of the settlement scheme, has so far made little progress.

An example of a "special area" lies in the relatively high altitude "bracken zone" of Kikuyuland, where, owing to the fact that satisfactory crops or good grass could not be produced, the land has hitherto remained undeveloped under a cover of bracken and poor Kikuyu grass. Land of this type is estimated to cover an area of about 300 square miles and it would obviously be of great value to the densely-populated Kikuyu Reserve if means could be found for its effective utilization. The rainfall is good but the steep slopes would limit the proportion of arable which would be practicable and place the emphasis on permanent pasture. The acid soil (pH 4.7) is deficient in available calcium, phosphate and nitrogen, but well supplied with incompletely decomposed organic matter. Physically it is puffy and dries out quickly after rain. Pot and field experiments have shown that lime has a big beneficial effect on crop growth, increases the nitrate supply, and reduces the amounts of available aluminium and manganese, which may constitute a limiting factor to growth. Phosphate alone produces a moderate response but a bigger one in combination with lime. In the field it has been found that natural regeneration, either directly following bracken clearing or after a cereal crop has been taken, does not result in a satisfactory grass cover within a reasonable time,

even if phosphate and farmyard manure are added. Planting Kikuyu grass after cultivation quickly gives a good cover but the grass is not very productive even when manured. Means are being sought, either to improve the growth of Kikuyu grass or to find more productive grasses and, as regards the latter, indications are that molases or guinea grass are satisfactory when established with the aid of farmyard manure or phosphate. On the arable side, satisfactory crops of potatoes, millets and silage oats have been grown when farmyard manure was applied, but not with phosphate only. Pyrethrum and vegetables have grown reasonably well when manured and other possible cash crops are wattle and certain decidous fruits.

The present position is that, although some factors require further study, the theoretical means of operating permanent and productive farming are probably within sight, but a permanent system will involve the application of lime and phosphate, which may not prove economic in view of the remoteness of the area and the poor existing communications. An important feature of future work must be to determine the amount and frequency of application of these materials.

European Areas

Experimental work was carried out on stations at Kitale (6,000 ft.), Eldoret (7,200 ft.), Ol Joro Orok (7,800 ft.) and, in Nakuru district, on departmental plots at Rongai (6,000 ft.), Njoro (7,100 ft.), Marindas (9,200 ft.) and Londiani (7,500 ft.). In all districts there were also co-operative trials on farms. Much of this work comprises crop variety and ley trials which were conducted in collaboration with the Senior Plant Breeder or the Senior Pasture Research Officer and are mentioned elsewhere under the appropriate headings. Except at Eldoret, the work was undertaken, in addition to their primary advisory and extension duties, by District Agricultural Officers. Much useful experimental work is being done by these officers but the facilities of the experimental stations will not be utilized to full effect, nor will investigational work be carried out really efficiently, until a properly-trained officer whose sole function is to do experimental work is available for each main station or district.

Long-term fertilizer trials, to study the residual and cumulative effects of superphosphate, sodaphosphate and Uganda rock phosphate, when applied once only or repeatedly over several seasons, and to examine the effects of these phosphates throughout the rotation when applied both to the ley and arable breaks, were continued. Residual effects of all fertilizers were evident but it is naturally too early for information on the main points to be available. Trials with five types of nitrogenous fertilizer (sulphate of ammonia, nitrate of soda, nitro-chalk, calcium cyanamide, and calcium nitrate) on the two main soil types at Londiani showed that, in this first season, there was no appreciable difference between them in their effect on the yield of wheat. Fertilizer trials with barley again showed that phosphate had the main effect on yield and quality. Long-term experiments were started on liming, in conjunction with fertilizer application, at Eldoret and Kipkabus and will be extended to other areas next season.

Work continued on the phosphate and drainage requirements of the heavy soils with impeded drainage which have relatively recently been brought into cultivation in the Thomson's Falls, Londiani, Kinangop and Sotik areas. Pot experiments to investigate levels of phosphate application with the drainage factor removed did not start until late in the year and no results are yet available. The field trials compare various types and intensities of drainage. The ridge and furrow system is the one chiefly used and comparisons are being made of different widths of bed, gradients of the furrow and lengths of furrow, or distances between cut-off drains. Mole drains and faggot drains, excavated and filled by machinery, are

also being tried. These observations will have to continue for several years in order to even out wet and dry seasons and to allow for changes in the soil resulting from cultivation and drainage to become apparent, but at present it looks as if a simple ridge and furrow system will be adequate.

On certain soils of the Njoro district wheat and barley yield but poorly without fertilizer while the application of phosphate has a most adverse effect, resulting in stunting and virtually no yield of grain. Field experiments this year, although suffering severely from drought, confirmed that applying copper is beneficial, but it is doubtful if this is the whole answer to the problem and investigations will be continued.

Apart from the main cereals, variety trials were undertaken with sunflowers, castor, fodder crops and *Hibiscus* species. At Eldoret and Kitale, dwarf sunflower varieties were again superior to the giant kinds. Provided they are suitably inoculated, lupins grow well at Eldoret and a mixture of oats and Fulton Sweet Blue Lupin is very promising for the production of high protein silage. Trials with various fibre crops at a number of stations in both European and African areas have shown that two local and three imported varieties of *Hibiscus cannabinus* do well under the lake rainfall régime of the West Rift areas but not in places where there are two relatively short rainy seasons as in the East Rift.

A feeding trial to test the value of Aurofac as a supplement to the ration for bacon pigs is still in progress but interim results suggest that the antibiotic is beneficial in improving the growth rate of runt pigs and enabling them to be carried through to bacon weight at a profit, without any adverse effect on grading, but with normal pigs the beneficial effect is probably slight. Long-term work on beef production was begun at Ol Joro Orok, using Boran and crossbred Boran by Hereford and Boran by Angus animals.

Grassland

Work was carried out at the main Grassland Research Station at Kitale, at the Molo high altitude sub-station, at most of the general husbandry experimental stations and on farms. The sub-station at Kabete was closed and it has still not been possible to start work in the drier ranching areas of the European and African lands.

At Kitale, the grass and legume nurseries, in which pasture species undergo preliminary testing, were extended by the planting of 420 new species or strains. These nurseries now contain large collections of the more important species and preliminary evaluation has revealed some outstanding new types, including leafy, vigorous and very stoloniferous forms of Rhodes grass, vigorous strains of molasses grass, *Setaria, Panicum maximum,* and *Brachiaria brizantha,* and some valuable grazing types of *Cenchrus ciliaris.* These grasses are those which appear most suitable for grazing and general purpose leys under the Kitale conditions, while the most promising legumes are lucerne, *Trifolium semipilosum, Alysicarpus glumaceus, Stylosanthes gracilis* and *Trifolium ruppellianum.* Special attention is being given to the nutritive requirements of lucerne and to the selection of improved varieties of this crop.

Ley establishment trials in the Kitale and Uasin Gishu districts have shown that although grass can be satisfactorily established under wheat or barley, there is usually a marked reduction in the yield of the cereal and it is thought that establishment in pure stand, or with an oat companion crop for grazing or silage, is likely to prove more satisfactory, particularly as it gives far more grazing in the establishment year. For the best results with pasture and fodder legumes it appears to be desirable to scarify the seeds, to apply phosphate and to inoculate with a suitable strain of *Rhizobium,* but no really satisfactory grass-legume grazing ley has yet been established in these areas.

An elephant grass legume mixture has proved very satisfactory for fodder and dry season grazing and the application of phosphate and nitrogen gives marked and economic yield increases. If close spacing is used the legume must be sown a month or two before planting the grass for satisfactory establishment, but at wider spacings of 4 ft. or 5 ft. both can be planted at the same time.

At the Molo station the main effort was concentrated on the problem of ley establishment on old arable land which is heavily infested with weeds, particularly Spurrey (*Spergula arvensis*) and Campion (*Silene gallica*). The use of hormone weed killers greatly reduced the weeds and resulted in better establishment and increased yields of perennial rye grass, Cocksfoot and Kentucky 31 fescue, but weather conditions were particularly favourable to spraying and the results need confirmation next season. A comparatively weed-free establishment was also obtained by discing in three crops of weeds before sowing but this means sowing rather late in the season with consequent loss of grazing—a drawback which does not arise with early sowing aided by spraying. Rolling with a Cambridge Ring roller before and after sowing was beneficial. Seed rates from 6 to 21 lb. per acre were tested and although a fair to good establishment was obtained at the lowest rate, about 13 lb. per acre seems desirable on this weedy land. All sowings were in seven-inch rows, using a grain drill. Early grazing and mowing assisted weed control, best results being obtained from very heavy stocking for short periods.

In many areas Kikuyu grass pastures become unproductive after three to five years, the grass becoming stunted, indigenous clovers disappearing, and a dense mat of living roots and undecomposed plant residues developing. Compared with a young and vigorous pasture, containing clover, the composition of the herbage from these degenerate swards is appreciably lower in crude protein and calcium and higher in crude fibre. Old pastures cannot be improved by ordinary top dressing with fertilizers, but experiments have shown that breaking up the mat by drastic ripping or ploughing, together with application of phosphate, is effective. Lime may be desirable on some soils and nitrogen usually increases production. Ploughing was better than ripping and gave quicker regeneration, pastures on the Kinangop being ready for grazing ten weeks after ploughing.

Coffee

Work was continued with the new species of *Anagyrus* and three species of predatory *Coccinellidæ* obtained in Uganda in 1951 with a view to improving the biological control of the Common Coffee Mealybug (*Planococcus kenyæ*, Le Pelley). The insectary breeding technique has been greatly improved and a large number of field liberations have now been made. So far only one specimen of the new *Anagyrus* has been recovered from the field.

Use of Dieldrin or Chlordane on coffee tree stems to control the mealybug attendant ant (*Pheidole punctulata*, Mayr.) has now virtually superseded all other methods. Further work is in hand in investigating the use of lower concentrations of these insecticides. Field trials have shown that no undesirable taints have been imparted to the coffee when these insecticides are used. The dyes, methylene blue and malachite green have been used successfully as additions in the diluted insecticides to enhance the efficiency of application. When these dyes are used both the operator and supervisor can quickly check that the "bands" are complete. During the period under review, the mealybug has caused remarkably little damage in plantation coffee, a state of affairs which can be attributed in no small measure to the use of these new insecticides to control the mealybug attendant

ant and the improved biological control which has resulted from better ant control. In the African Land Units of the Central Province the mealybug has again caused very little damage.

Field results and soil structure studies over a five-year period have shown that the hand-fork is superior to the disc harrow or plough when these are used to control weak growth during the rains: yields were 15 per cent higher (equivalent to 1 cwt. of clean coffee per acre per annum) and deterioration of surface structure, measured in terms of free-draining pore space and percolation of rainfall, was slower than on land weeded by disc or plough. Furthermore, after forking the soil surface is less liable to erosion than land ploughed or disced wherein off-contour furrows are formed.

When the advantages of weeding by fork were realized a tractor-drawn implement was sought which would produce the large clods left by the hand fork. To this end modified versions of a rotary hoe were tested; in 1953 a modified hoe was tested which appeared to be capable of producing the rough tilth of the hand-fork. Subsequently, a long-term trial was laid down in which the new implement is compared with the hand-fork for effects on soil structure and tree yield.

After three years the first phase of an investigation of the effect of fertilizers and manures on Napier grass grown for mulching was concluded; trials on old established grass were discontinued and manurial dressings in the trial planted in 1951 were doubled. Analyses of Napier grass have shown that potassium forms two to three per cent of the dry weight, i.e., Napier grass grown for mulching coffee extracts from the soil annually 400 to 1,400 pounds of Potassium Oxide per acre. On account of this heavy uptake, and subsequent loss to the soil on which the grass is grown, it is reasonable to suppose that the yield of grass might be increased by addition of potash. Consequently the response to bi-annual dressings of one hundredweight of Muriate of Potash per acre are now being studied as part of the revised trial.

The principal investigations of the Plant Pathologist continued to be those on anti-leaf-fall spraying. In the field experiment at Solai on times of spraying, concentrations and rates, very large responses to spraying were recorded for the 1952–53 crop, which is the second since the start of the experiment. Spraying at all the three times tried, i.e., end of May, end of July and end of September, gave responses, but these were far greater with the May and September spraying than with the July spraying. These two times gave nearly equal responses, which in the case of the best rate and concentration combination amounted to over three times the weight of cherry obtained from the unsprayed plots. The effect mainly consisted in maintaining a heavy crop following a heavy crop the previous year, whereas in the unsprayed trees the heavy crop of 1951–52 caused only a low crop to be gathered in 1952–53.

The low response from July spraying is in agreement with the effects on leaf-fall noted last year and confirms the previously expressed opinion that spraying should not be carried out when active leaf-fall is occurring, in other words, during a minimum growth period.

The effects of rate and concentration (expressed as copper per tree) were not so marked, but the highest amounts of copper per tree gave overall significantly higher responses and the higher rates gave overall lower responses. This was a rather surprising result and indicates that it is better to apply a given quantity of copper to a tree in a concentrated rather than a diluted form. In fact, it appears that a two per cent concentration at one pint per tree was the best concentration and rate.

It has been the practice of spraying firms to apply rather low concentrations but increase the rate in compensation. In view of the results given above this appears to be an erroneous practice and in consequence the question of rate and concentration was carefully examined and definite recommendations made which were circulated to the spraying firms and also a less technical communication was published in the Coffee Board *Bulletin*.

As the post of second Plant Pathologist remained vacant, it was not possible to expand investigational work on Coffee Berry Disease, but observations on its incidence were made and selection work continued. The disease was again present in the Upper Kiambu area in spite of the climatic conditions not being very favourable to it. In the early stages, the crop was only attacked to a very minor extent, and this attack was largely confined to certain susceptible types of coffee. Shortly before the crop began to ripen, however, the disease developed to quite a fair extent and economic losses were entailed. The infection, although of a relatively low intensity, was widespread and considering the fact that this year was not particularly suited to the development of Coffee Berry Disease climatically, it would appear that in wetter years there is good reason to anticipate considerable economic losses being caused. It is now clear that the attack of 1951 was not merely due to the climate at that time being peculiarly suited to the disease, but that the disease had arrived in the area for the first time, either by introduction or by mutation from other less pathogenic forms of the fungus. In consequence increased efforts to find a direct method of control are considered advisable, even though the chances of finding one seem rather remote. In the meantime, new selections from Blue Mountain coffee are now available and it is intended to test these in three trials, one at Kitale and two in Upper Kiambu in 1954.

A disease leading to the gradual death of Grevillea trees in Upper Kiambu was recorded and a preliminary investigation made. It appears to be a type of gummosis in which the cambial tissues become laden with a bright yellow, gummy material which later turns dark red. Gum oozes from the bark which darkens and the leaves first turn a dusky green and are then lost and eventually the tree dies. No organism has so far been detected in the affected tissues and the nature of the disease remains problematical.

In the Kabete area, a peculiar type of die-back was recorded on multiple-stem coffee. The main stem in the skirt region of the tree or lower dies over a length of a few inches, and subsequently the whole head, withers or breaks off. A fungus (*Phomopsis* sp.) was isolated by the Senior Plant Pathologist and inoculation experiments are now being carried out with it.

Pyrethrum

The production of improved strains continued to occupy a major part of the time of the pyrethrum team. Seven hundred and five single plant selections, mostly selected from progenies obtained by crossing between pairs of good clones, were under observation. A number of new hybrids were obtained by crossing between recently selected clones or by back crossing of plants selected within existing hybrids to one of the parent clones. Promising crosses were tested in 11 variety trials under a range of conditions. Work on a longer term breeding system, similar to that used by sugar beet breeders, continued at Molo and Subukia. Dr. Kroll visited the pyrethrum growing areas of Dalmatia while on long leave and brought back seed of wild and cultivated plants which may be of value in the breeding programme. It has become evident that the pyrethrin content of flowers, as determined by present methods, is not necessarily a sound

criterion of their toxicity to insects and it is therefore important that breeding material shall be bio-assayed if further work is to proceed with certainty, but unfortunately it was not possible to arrange for the necessary bio-testing during the year.

The incidence of bud disease appeared to be somewhat higher in 1953 than in the two preceeding seasons but so far no economic means of control by cultural methods or spraying has been found. A number of plants have been selected in the field for apparent resistance to the disease and clones derived from them have appeared to show resistance over several seasons when subjected to the uncertain conditions of natural infection. Recently, however, the Senior Plant Pathologist has developed a technique for artificial inoculation with pure cultures of the fungus, and the selected plants have not stood up to this test.

Factorial manurial trials involving nitrogen, phosphate, potash, farmyard manure and mulching, which have run for three seasons, have shown no appreciable response to any treatment, except mulching at Ol Joro Orok and Subukia. On the other hand, experiments to compare various placement methods for applying phosphate to pyrethrum grown both on the flat and the ridge, have shown marked responses to this nutrient on certain soils. Placement of phosphate at the base of the ridge before planting has given yields significantly greater than all other treatments over two seasons.

Sisal

During the year two of the older field trials were concluded and five new ones were planted. There are now 23 major trials in progress with a total of 1,110 plots.

The second cycle of a nursery fertilizer trial on the same site again showed a marked benefit from application of sisal waste and sulphate of ammonia and, in addition, there was a response to phosphate, which had not previously been observed. In the field fertilizer trials on the station there have been responses to sisal waste, nitrogen, phosphate and lime. Further trials will be started on the station to determine the optimum rates of application of fertilizers and to assess the economy of their use, and the first two of a series of experiments to explore the fertilizer requirements of other sisal growing areas have been begun.

The five complex trials which are in progress to investigate spacing and cutting under a range of soil and climatic conditions are indicating that yields generally increase up to a plant population of about 2,000 per acre and that the higher populations do not cause appreciable reduction in leaf length. Early cutting, at about the 100 leaf stage, which is expected to retard poling and thus extend the life of the plant, has not so far had any effect on the rate of leaf production but it does seem to reduce the normal increase in leaf length. Light cutting, leaving 30 to 35 leaves on the plant, is preferable to heavy cutting.

In the cultivation trial, which compares clean weeding with controlled grass strips between the rows, the grass strips have not so far retarded the growth of the sisal. The use of grass strips in conjunction with sisal waste and fertilizers is being tested in other trials sited on land which has carried sisal for some years but these trials are too young to produce results.

Sodium trichloracetate as a pre-emergence spray has continued to be fairly successful in controlling couch and, despite its cost and the difficulty of timing its application satisfactorily, is now being used to a small extent on estates.

Sugar

A number of variety trials were continued in the Miwani–Kibos area of Nyanza Province. A trial started at Miwani in 1950 had its first ratoon harvest which again demonstrated the superiority of CO.421 to other varieties. Harvesting was done of four variety sorting trials, started in 1953, which tested 48 more recently introduced varieties on the two main soil types. It was concluded that 40 of these varieties could be discarded while eight—CO.411, CO.426, CO.205, CO.407, CO.312, CO.301, CO.423 and CO.213—warranted further trial. A variety trial at Kakamega, in the African area, gave excellent results, the best variety, CO.421, yielding 66 tons of cane per acre.

Fertilizer trials, which included nitrogen, phosphate, potash, molasses and filter press mud, were continued at the Coast and in Nyanza Province but will not reach the harvesting stage until 1954.

Trials with herbicidal sprays for weed control gave good results at the Coast but were less satisfactory in Nyanza, where only a fair control was obtained from the best treatment, a combination of MCPA and TCA.

Horticulture

Unseasonable frosts at Molo during July–August caused deciduous fruit trees to break their dormancy better than usual, though mean temperatures were not lower than normal. As a result all fruits set good crops, in fact, the crop on most plum varieties was too heavy, with consequent deterioration in quality. As hand thinning of the crop would be uneconomic, experiments in chemical thinning are indicated.

An observational apple rootstocks trial was planted out in July, to test three different rootstocks with three scion varieties. The trial is repeated under irrigation and under dry land conditions. Our knowledge of the rootstocks and of the scion varieties is not yet sufficient to justify a statistical trial.

Selected peach seedlings from the Lessos area are bearing their first crop at Molo this season. The performance of young trees of these seedlings in growers' orchards, is justifying our present policy of recommending the planting of seedlings, in preference to budded trees, of some of the varieties which have been popular in the past.

Many of the young citrus trees in the variety orchard at Matuga bore their first crop this year. In many cases, quality of the fruit was disappointing, the incidence of granulated fruit being high. Granulation, which is a complex physiological problem, is likely to be a fairly serious matter in citrus at the Coast owing to the hot, humid climate. Apart from climatic causes, over which we have little or no control, the main factors affecting its incidence are varieties, rootstocks and, possibly, the use of seedlings instead of budded trees and lack of irrigation. Investigational work now being carried out, will probably reduce losses caused by granulation very considerably, but it is very unlikely that it will ever be completely eliminated. Too much importance should not be attached to the incidence of granulation on young trees as the true susceptibility of a tree can only be assessed when it has reached maturity.

Fruit harvested from the Meyer Lemon at Matuga was of exceptional quality, with a very high juice content, and this variety is being recommended for local planting. Very good results were obtained by curing lemons at Molo. The cured fruit had a very deep, even colour with relatively thin skins and sold on the local market at Sh. 7 to 9 per 100.

A number of new pineapple trials were started at Thika, Kilifi, Ruiru and Kitale this year. At Thika, 2,000 lb. of sulphate of ammonia per acre (10,000 plants per acre) has resulted in an increase of just under four tons in the plant crop, on replant land. This increase paid for the fertilizer used and any increase in the first ratoon crop will be pure profit. At Kilifi and at Rongai the use of mulch has had beneficial results on the growth and colour of the plants.

The yield of Melba strawberries at Molo has been greatly improved by the selection of vigorous planting material, and by deflowering the young plants for a longer period after planting. The Cambridge Pine strawberry has proved successful in trials and arrangements have been made for a bulk importation for multiplication and distribution to growers and nurserymen.

Youngberries at Molo are proving to be very susceptible to wind. Plants growing on comparatively poor soil in a sheltered situation have made far better growth than plants grown on better soil but exposed to wind.

The first full cutting season on a one-seventh-acre plot of Mary Washington asparagus, took place at Molo in October. The total yield was 432 lb. untrimmed, most of it grade one (12–16 sticks per pound). Plants spaced at 7 × 1 feet yielded better than those spaced at 4 × 1½ ft.

Further trials of Texas Grano onion are again giving good results. A plot at Kakamega yielded at the rate of 12 tons per acre. At Molo the trial had a bad start owing to dry weather after sowing, but in spite of this a fair crop will be harvested. Yellow shallots, under trial at Molo, have grown well but have failed to bulb. This variety is evidently unsuited to short-day conditions.

Plant Pathology

Owing to the generally prevailing drought conditions plant diseases were on the whole less prevalent than in the previous year, 405 specimens of diseased material as against 589 being received at the laboratory.

During the year Bunt of Wheat (*Tilletia fœtans*) was recorded for the first time.

Investigations on the Bud Disease of Pyrethrum, *Ramularia bellunensis*, were continued and intensified. Studies of the growth of the fungus under controlled conditions and the course of infection are in progress. Ten selected clones which have shown field resistance were tested for reaction to inoculation by pure cultures of the fungus. All appeared to be equally susceptible. The phytotoxicity of certain fungicides was ascertained as a preliminary to field trials.

A study of the Brown Rot Disease of Passion Fruit, *Alternaria passifloræ*, was continued. A technique for mass infections for large plants in the greenhouse has been worked out for the testing of fungicides and observations on the progress of the disease. A small field plot has been established for demonstrations of pruning and spraying.

The maintenance and distribution of legume nodule cultures was continued, 231 distributions were made during the year, and a number of local isolations were made. Some of these have been sent to Australia for use with Kenya legumes recently sent there.

Further lines of Blight-immune potatoes were received from Corstorphine. Previous introductions are being tested at two experimental stations.

During the year the work on stem rust of wheat, which has been done in this section since the first physiologic forms were studied some 20 years ago, was transferred to the Plant Breeding Station. Progress made will appear in the report of that section as well as future reports on cereal diseases generally.

Seed Testing Service

One thousand seed samples were received for testing.

In addition to routine tests, special tests were done on various indigenous grass seeds to ascertain periods of dormancy and longevity and on tea and oil seeds on behalf of the Entomological Section, to test the effect of fumigation.

Entomology

A new pest of cereals was found in the Solai area. This fly, *Hylemyia arambourgi*, destroyed the central shoots of barley plants and this often led to the death of the plants or to a lower yield of grain. No adequate control measure is known at present.

Aerial spraying against Maize Stalk Borer, *Busseola fusca*, was tried in the Nakuru area in collaboration with the Colonial Insecticide Research Unit, but owing to drought conditions, results were not conclusive, although a reduction of the borer population occurred. Laboratory tests on this borer have been carried out and new insecticides have shown good promise. Further information on life history has been obtained and an egg parasite discovered.

A field trial using seed dressings and soil insecticides against Black Wheat Beetle, *Heteronychus consimilis*, was laid down at Ol Joro Orok, but drought conditions resulted in poor yields. Treatment with Mergamma dressings or Aldrin dusts were, however, shown to be well worth while and confirmed results obtained in 1951. Plot tests with known populations of the Trans Nzoia Chafer grub, *Schizonycha* spp., also demonstrated the effectiveness of Aldrin dust and a much better yield was obtained with this insecticide than with other treatments.

Dusting growing Haricot beans with D.D.T. dusts was carried out at Embu to reduce the field infestation of the Bruchid, *Acanthoscelides obtectus*. As only 0.2 per cent of the beans were infested in the controls it was apparent that the treatment was not economic.

Work at the Coast on *Theraptus* sp., the Coreid Bug attacking coconuts, and other pests, was interrupted by the Entomologist's call-up for Emergency duties.

Surveys of cotton problems were carried out in Nyanza, as a result of which it was decided that work should be undertaken there next year on cotton and other plants.

A heavy outbreak of Army worm occurred at the end of the year but was fortunately restricted to a small area. Field tests showed that Endrin was extremely effective but until this material is available D.D.T. in the form of wettable powder or miscible liquid is a satisfactory treatment and remains effective for at least 10 days.

Breeding of the ladybird, *Hyperaspis jocosa*, continued on a reduced scale and further liberations were made. A second specimen, *Hyperaspis donzeli*, was imported but is breeding slowly in the laboratory. The Tingid bug, *Teleonemia scrupulosa*, almost died out at the beginning of the year but increased sufficiently for a liberation to be made at the Coast in October. At least three generations were found in the field and it is hoped that this enemy of Lantana will successfully establish itself.

Experimentation with maize on the cob in cribs has been continued with different concentrations of gamma B.H.C., which was again shown to be effective. Treatments with pyrethrum dusts to protect the outside layers were not effective. The results of the 1952 experiments were published in the *East African*

Agricultural Journal of October, 1953. Experiments with Bruchids on Haricot beans and pybuthrin in maize and treated bags were carried out. A survey of African storage was continued. A trial with methyl bromide fumigation of stacked maize under balloon fabric was carried out successfully, but the experimentation had to be discontinued because of lack of storage space.

Soil and Agricultural Chemistry

Expansion of fertilizer and soil fertility investigations brought with it an increase in soil and plant tissue analyses undertaken in conjunction with field trials. Such analyses were undertaken with the aim of providing firm bases for the design of the trials concerned and of increasing the amount of information obtained from them. Studies in particular detail were undertaken in connexion with the designing of critical soil fertility maintenance, and liming trials in the Kenya Highlands. The studies reached the most advanced stage in connexion with the liming trials; in these, the expected effects of liming on soil reaction and effects on crop yield have been recorded. In a study of fertility building by *Glycine javanica*, the effect in the first two years has been crumb stabilization rather than increased nitrogen and organic carbon content.

The ammonium nitrogen content of daily rainfall at Scott Agricultural Laboratories, has been subjected to further examination; results to date suggest that the contribution to soil ammonium nitrogen by local rainfall is somewhat less than 0.1 lb. per acre per inch of rainfall, marked seasonal variations in the rate of addition being apparent.

The effects of liming on soil nitrate content and on plant growth were studied using an acid (pH 4.7) soil of low inherent fertility which is of considerable interest in connexion with the relief of population pressure in certain African occupied areas. Liming to pH 6 was found markedly to improve growth, though apparently not through its acceleration of nitrate liberation. Phosphate application also improved growth, but to a less extent than the lime treatments.

Soil surveys in collaboration with the Soil Surveys Division, East African Agricultural and Forestry Research Organization, were extended to new areas. Meanwhile, field officers started producing first attempt soil maps based on their local field knowledge in districts where collaborative surveys have not yet been initiated. Reconnaissance soil surveys were undertaken in under-developed areas which had not previously been visited.

During the year, growth distortion effects were reported on maize in Trans Nzoia which had been sprayed with hormone type weed killer. After a field inspection of the symptoms, pot trials were undertaken with a view to elucidating some of the factors contributing to the development of the condition. The information so obtained supported the conclusion reached in the field that prolonged dry conditions after spraying may lead to major growth distortion, and that with the subsequent onset of wet weather, recovery is rapid and complete.

Work was initiated on the control of prickly pear by herbicides.

Further information was collected on the composition of a wide variety of agricultural products, manures and stockfeeds, particular attention being given to farm produced stockfeeds, and the methods of determining moisture in grain.

Plant Breeding and Selection

Plant Breeding and the trial of introduced varieties of a number of crop plants is carried out at Njoro (7,100 ft.), Molo (9,300 ft.), Ol Joro Orok (7,800 ft.), Rongai (6,000 ft.), Eldoret (7,000 ft.), Kitale (6,000 ft.) and the Scott Agricultural Laboratories (5,700 ft.).

Wheat

It is possible that two new physiologic forms of black stem rust of wheat have appeared. This is still the subject of test and, if confirmed, these will make the 13th and 14th forms to be identified in East Africa. The main rust forms prevalent in Kenya and Tanganyika during the season were K.9 and K.12, with K.10 and K.11 found on a smaller number of occasions. Form K.6 has reappeared on material from the bulking plots on this station.

The wheat breeding programme, aimed at the production of varieties combining high yields and quality with rust resistance, was carried a stage further; and rust resistant hybrids which had reached the bag stage were promoted to field scale multiplication tests under farming conditions. This work received a serious setback owing to the dry season, and a number of new wheats and barleys which were being multiplied with local farmers were lost due to drought. This will mean the lapse of some years before the small stocks which remain can again be increased to field scale proportions: and there is always the chance of new rust forms arising in the meantime and attacking these varieties.

A large number of new hybrids were under test and multiplication on the various departmental stations: and the best of these will be grown on next season. New introductions from various sources were under observation. Most introductions are not found suitable for growing in Kenya, but they may provide valuable new sources of rust resistance for use in the crossing programme to combine with locally adapted varieties. No new crosses were made during the season since a large amount of material from the 1951 and 1952 crosses still remained to be dealt with and it was, therefore, decided to concentrate on this material in the first instance. Samples of all wheats undergoing multiplication were sent for baking tests to the laboratory of the millers, Messrs. Unga, Limited.

With the posting of a full-time pathologist to Njoro, the rust and other cereal work was transferred there from Nairobi. Stock cultures of the rusts were maintained, and a total of 71 wheat samples were taken for seedling tests to the latest stem rust forms. In addition, 91 wheats from the breeding cages, field plots and from the annual rust survey, were brought in for tests on the identity of the rust forms present.

A new and potentially dangerous disease of wheat has been recognized and is caused by the fungus *Pyrenophora triticirepentis*. A note of warning and advice to farmers has been issued through the medium of the local Press. Other investigations on hand include the problem of seedling resistance and mature plant susceptibility in wheat to stem rust, and resistance in wheat to Take All.

Barley

Two new barleys, Abed Kenia and Herta, were released to farmers from Departmental control. Both are Scandinavian types with short, stiff straws, and have done well in trials at various centres and over a number of seasons. They are likely to be suited to the cooler, wetter conditions over 7,000 ft. in Kenya, and can give grain of malting quality if conditions are right. Further introductions, including a range of the newer Scandinavian types, advanced a stage further in the bulking programme. Proctor, a cross between Kenia and Plumage Archer, and the latest British barley to be released, did well in the preliminary plot series and will be carried on to trials in 1954. Both Blue barley from Southern Rhodesia and a malting variety from Czechoslovakia, which were being multiplied on a field scale with local farmers, were lost due to drought. A barley hybridization programme was started using the short-strawed Scandinavian types, and the locally successful Research and Prior, with the object of producing a more satisfactory barley for local use.

Oats

The programme of oats introduction continued. The crosses of Hajira-Joanette from Minnesota, which proved promising over the past two seasons, were quite severely attacked by stem rust and many badly damaged. It seems unlikely that these varieties will be of use in the lower areas, and trials will continue in the higher country. Rusting has proved so severe at Njoro in recent years that it has now been decided to move the bulk of the oat work to the higher level stations, particularly Molo and Ol Joro Orok. The variety 3003F 1948, from Ottawa, has shown good promise and has been promoted to the field multiplication plots. A number of other promising introductions were on test at various departmental stations during the season, and are going through the earlier stages of multiplication.

Maize

All the maize trials at Njoro and Rongai failed this season due to drought: and it was only with the greatest difficulty that the fixed inbreds were kept going by hand watering. Valuable material lost includes trials of double and top crosses, and a new synthetic compounded from variety times first generation inbreds. This is the first cycle of a programme designed to produce self-propagating, higher yielding maize and is an attempt to get away from placing all our eggs in the hybrid maize basket. Its loss represents a very serious blow to the breeding programme. Material undergoing inbreeding has, for the most part, been lost: and recourse will have to be taken to seed left over from the previous season. This will mean the loss of a full year's work.

The programme at Kitale fared better: the fixed inbreds were bulked and a wide range of top crosses to local variety made for trial in 1954.

In co-operation with the East African Agricultural and Forestry Research Organization, an experimental programme was started at Kibarani on the Coast with the object of transferring resistance to the new maize rust, *Puccinia polysora*, from introduced varieties to adapted local maize. Resistance was found in certain lines, and these were crossed to a range of local types.

Castor

Work was continued with selection and bulking of introduced Castor oil varieties with a view to mechanization of the crop.

PART III—FIELD SERVICES

Progress in Improved Farming

European Areas

Mr. L. G. Troup, O.B.E., the Commissioner appointed to inquire into the general economy of farming in the Highlands, completed his inquiry at the end of January and his report was published early in May, 1953. In his "Summary and Recommendations", Mr. Troup stated that there would appear to be no cause for concern in the present indebtedness of the farming industry. He was satisfied that the ever-increasing demands of Kenya for food, together with the needs of neighbouring territories and countries farther afield, will provide a sufficient market for Kenya products and that Kenya should be in a position to compete in the export field. The areas in Kenya (including part of the European Highlands) which enjoy a satisfactory rainfall are capable of intensive food production. Rapid progress has been made in recent years and the speed of agricultural and livestock development should be accelerated.

Mr. Troup outlined a production target that he considered to be capable of achievement in 10 years and which, by the expenditure of approximately £55,000,000 additional capital, would increase annual gross revenue from agricultural sources from a present estimated figure of £8,693,500 to £28,220,000. The development envisaged was subject to the following conditions:—

(1) A sense of security in the future of the European Highlands.

(2) The determination of the European settler to increase production.

(3) European immigration.

(4) A distributed water supply on every farm.

(5) Proper soil conservation measures.

(6) The development of drainage.

(7) The increase of cattle, sheep, pigs and poultry.

(8) A satisfactory supply of essential farming requirements.

(9) Development of technical investigation and advice.

(10) The provision of finance.

Mr. Troup made specific recommendations on conditions 3 to 10 above, as well as on a number of other matters that came within the scope of his terms of reference. Copies of the report without maps are obtainable from the Government Printer, Nairobi, at a price of Sh. 5.

In the conclusion to his report Mr. Troup stated, "It is unfortunate that my return visit to Kenya has coincided with the Emergency period, during which normal life has been, to some extent, disrupted, and concentration of effort and thought has perforce been required on more immediate problems. This has made the task of giving full consideration to long-term plans less easy". Although the Emergency continued throughout 1953, the Troup Report was studied by the Board of Agriculture, the Kenya National Farmers' Union and other organizations concerned, and it was expected that the Government would issue a white paper on the report in 1954.

On most farms the intensification of food production involves a change of system from continuous cropping with either maize or wheat to rotational mixed farming, in which system grass leys and livestock, mainly dairy cattle, play an essential part. The introduction of dairy cattle implies expenditure on the purchase of stock, the provision of fencing and water supplies, and the construction of dipping tanks and farm buildings. The fact that progress in this change of system was not greater in 1953 was due largely to the Emergency. Many farmers and farm managers were absent on Emergency duties, many disloyal labourers had to be replaced by inexperienced men from the loyal tribes, and many farmers were disinclined to buy more cattle in view of the risk of theft. Nevertheless, certain definite progress can be recorded.

The area under grass leys in the Rift Valley Province increased from 59,300 acres in 1952 to 76,384 acres in 1953: most of the increase in area was sown in the Trans Nzoia and Nakuru districts. Although this increase is a welcome step in the right direction, the proportion of the total cultivated area that is under leys is still less than 10 per cent, compared with the desirable proportion of 50 per cent. A shortage of grass seed of species and strains suitable for ley farming in the higher areas was one of the limiting factors: another was the shortage of agricultural staff to advise the farmers on the establishment and management of their leys. Many farmers are making hay from the surplus production of their leys and a limited number are making grass silage.

There was an increase in the number of cattle on European farms in all districts of the Rift Valley Province, and in the Uasin Gishu and Nakuru areas, despite the drought, there was an increase in the total output of livestock products. The fact that dairy farmers in these areas were able to make good profits from the sale of fresh milk in a year when grain crops failed has provided a stimulus to the adoption of intensive mixed farming. Other signs of progress were an increase in the mileage of fencing in the Uasin Gishu, a decrease in the numbers of "squatter" stock, and a considerable increase in the demand for farm planning. On the Kinangop Plateau, good progress was made under the regional plan for windbreaks and field drainage.

The movement towards rotational mixed farming was again considerably assisted by the making of further loans from the Agricultural Lands Rehabilitation Fund. Up to 25th May, 1954, 492 loans had been approved for sums totalling £673,272. Of this sum, about three-quarters was lent for the purchase of cattle and most of the rest for the installation of water supplies and for the construction of fences and farm buildings. The details were as follows:—

LOANS APPROVED FROM AGRICULTURAL LANDS REHABILITATION FUND TO 25TH MAY, 1954

DISTRICT	No. of Loans	Cattle	Water Supplies	Fencing	Buildings	Various	Total
		£	£	£	£	£	£
Uasin Gishu	196	172,707	15,597	31,535	16,942	1,065	237,846
Trans Nzoia	103	102,085	12,558	14,590	7,005	1,731	137,969
Nakuru ..	61	65,215	9,781	3,175	1,755	5,195	85,121
Naivasha ..	50	46,035	8,801	8,283	8,488	3,990	75,597
Sotik ..	14	15 447	3,170	1,300	350	460	20,727
Lumbwa ..	20	19,127	1,465	5,510	2,390	625	29,117
Laikipia ..	33	25,920	16,745	4,560	4,517	6,150	57,892
Nyeri ..	6	6,715	900	250	480	750	9,095
Machakos ..	1	750	—	250	—	—	1,000
Nairobi ..	7	5,200	4,704	—	120	1,684	11,708
Thika ..	1	—	—	—	—	7,200	7,200
TOTAL ..	492	459,201	73,721	69,453	42,047	28,850	673,272

Seed Certification.—The Seeds Officer at Nakuru received 51 applications for certification of seed wheat and 30 applications for certification of seed barley. The area inspected was 5,030 acres, of which 4,004 acres were passed. The number of bags of cereal seed that were sealed and certified during the year was 7,467.

ASIAN AREAS

In the Nyanza Province the Indian farming area near Kisumu is devoted almost entirely to the growing of sugar cane, some of which is used for making jaggery on the individual farms and the rest sold to the Miwani Sugar Mills, Limited, who are the largest producers in the area. In 1953 the production of sugar cane was reduced by the severe drought conditions that prevailed during the first seven months of the year. Nevertheless, some progress was made with the improvement of farming. The Miwani Company began the construction of an irrigation scheme on their estate at Chemelil, they extended the area planted to the high-yielding cane CO.421, and they experimented with machines for ditch-digging and cane harvesting. In the cane farming area, the road from Kibos to Miwani was reconstructed and improvements were effected in the jaggery mills to make them more hygienic.

In the Coast Province there are Asian-owned plantations that produce coco-nuts, sugar, sisal, kapok, mangoes and pawpaws. In 1953 the coco-nut plantations were improved by the destruction of many dead and dying palms. The few

remaining Asian dairies on Mombasa Island were removed to the mainland. Indian market gardeners on the mainland grew increasing quantities of vegetables for sale in Mombasa.

African Areas

General.—Most of the agricultural land in Kenya is farmed by African peasants, and in 1953 a great deal of attention was given to the problems of improving the farming and increasing the production of this important section of the agricultural community. Early in the year the Department prepared a comprehensive memorandum on the agricultural problems and potential of the African lands for the East African Royal Commission. In that memorandum all the African lands were classified into nine land-use zones on the basis of their plant ecology, and their potential production was assessed on a basis of the optimum known land-use system for each zone. The population potential was assessed on the basis of a minimum economic holding and a land tenure policy based on individual smallholdings was advocated strongly.

Towards the end of the year, Mr. R. J. M. Swynnerton, Assistant Director of Agriculture, prepared a comprehensive five-year plan to intensify the development of African agriculture. The plan was accepted by the Kenya Government as the framework within which the development of African agriculture should proceed. Her Majesty's Government in the United Kingdom made a grant of £5,000,000 to meet most of the cost of implementing the plan, and at the end of the year the stage was set for a new era in African agriculture.

In the meantime, routine work on the improvement of African farming was continued in the provinces:—

Nyanza Province.—In order to provide a basis for the measurement of progress in future years, a survey was made to determine the area of land in the Province that was farmed under sound systems. The results of this survey showed that the percentage of the usable land that was properly farmed varied from 56 per cent in Kericho to 10 per cent in North Nyanza, and to less than one per cent in Central and South Nyanza. In Kericho, where enclosure and the subsequent development of holdings is proceeding very rapidly, it is expected that within a few years the whole district will be farmed under a sound system. In North Nyanza well-managed holdings cover about 100 square miles. In Central and South Nyanza there are a few good individual holdings, but they represent a negligible percentage of the total usable land.

The offer of various incentives to better farming was continued. The most important of these is the scheme for "Rewards for Good Husbandry", the cost of which is met from district Agricultural Betterment Funds. Under this scheme a farmer who (1) has complete and adequate soil conservation works throughout his lands, (2) rests half his arable land under grass, and (3) maintains the fertility of his cultivated land by the use of properly made farmyard manure or compost, qualifies for an initial award from the Fund. As his standard of farming improves he can qualify for further awards, all of which are made at public gatherings and in the form of some goods or services necessary for the further development of his holding. In 1953 in some districts funds were inadequate to pay for many such rewards. This being so, the standard of inspection was raised and awards were made only to the best farmers. Another incentive takes the form of a refund of half the Agricultural Betterment Fund cess on maize to farmers or groups of farmers who produce a certificate of good husbandry and who deliver their maize to the Control organization in three-ton lots. In 1953 this bonus was paid to 990 farmers in North Nyanza on total deliveries of 19,958 bags of maize. In addition, some loans were made to approved farmers towards the cost of specified improvements to their holdings.

A start has been made on the planning of African farms, principally in the North Nyanza district. In the north, where there are large farms of from 60 to 300 acres, farm planning is comparatively simple, but in the south, in the over-populated areas of Maragoli and Bunyore where the land is held in fragments, farmers must consolidate their holdings before these can be planned. Some progress in the improvement of stock husbandry has been made, especially in the Kericho district, where there are 300 square miles of enclosed holdings. Kipsigis farmers who have raised their standard of feeding and management are getting a gallon of milk a day from selected native cows. In the Province as a whole there is much room for improvement of the grassland, most of which is still covered with useless shrub and weeds. Tree planting is making fair progress with the new arrangement under which African farmers buy a packet of tree seed and raise the plants in their own nursery.

Rift Valley Province.—In the more favoured parts of Nandi, Elgeyo and West Suk, the enclosure of individual holdings is proceeding at a surprising pace. The Department has taken active steps to encourage this movement because enclosure is the foundation upon which progress in improved farming may be built. Demonstration holdings have been established in all suitable areas and farmers are given advice on the enclosure and development of their individual lands. Young Farmers' Clubs have been formed in Nandi and Elgeyo, parties of farmers have been taken to see highly-developed African farms in the Kericho district, and loans have been made to approved applicants to assist them in the development of their holdings. Most progress has been made in the Chepkoria area of Elgeyo and in the Kapsikak area of Nandi, where there are now several contiguous well-managed African farms.

In the semi-arid areas, where progress is measured in terms of effective grazing control and the provision of water supplies and salt licks, a noteworthy improvement occurred on the Leroghi Plateau. There was a small increase in the sales of stock from all districts except Nandi, where there was an outbreak of Foot-and-Mouth Disease. The offtake of stock is still considerably below the natural increase and better marketing facilities are an urgent need.

Central Province.—In 1953 the African farmers in the Central Province were preoccupied with the Emergency. As the result of large-scale turn-outs for communal work, considerable improvements of a general nature were effected in the districts, but little progress could be made in raising the standard of farming on individual farms. A large area was added to the potentially useful land by the clearing of 47,000 acres of bush and bracken. The best advantage of this work was taken in the Kiambu district, where the cleared areas were immediately fenced into paddocks and planted to grass. A total of 12,833 new cattle sheds were built during the year and in 7,621 of these farmyard manure was properly made and applied to the land. The number of compost heaps or pits in use increased by nearly a thousand to 37,773, and 9,693 acres were planted with grass. Further details of the improvements effected in the districts will be found in Table F.

The small body of progressive farmers experienced a difficult year, particularly those in the Nyeri district. Most of them did full-time duty in the Home Guard and the security situation was such that their livestock had to be removed from the farms and kept in compounds near the Home Guard posts, with a consequent loss of condition in the stock and of manure to the farms. Nevertheless, there was no loss of faith in the benefits to be obtained from a consolidated and well-farmed holding. In the Nyeri district two African surveyors worked full-time on the consolidation of holdings within the Mbari lands and the demand was such that eight more surveyors are required for this work.

Southern Province.—The major problem of the agricultural areas of the Southern Province is over-stocking. Crop failures, due to drought, occur about every third season, and in the past the Wakamba have relied upon large numbers of stock as a reserve of food. This tradition has resulted in the denudation and erosion of the countryside, and in a period of extreme drought such as occurred in 1952–53, herds of starving animals invade the improved farming areas. The problem is being tackled by the closure and reclamation of denuded land, by grazing control schemes, by the clearing of relief grazing areas and by the encouragement of stall feeding of stock on crop stovers to spare the pasture during the hot, dry seasons. In Machakos, where the movement for stall feeding is actively encouraged by an enlightened African District Council, 92 new cattle sheds were built in 1953. The value of the high quality manure made in these sheds is appreciated and placement manuring of crops planted on the contour is practiced by an increasing number of farmers in the more advanced Kagundo area. Banana planting in deep trenches on the contour has made remarkable progress and the area of bench terraced land is expanding steadily. The area protected by bench terraces in 1953 was 9,133 acres, a praiseworthy achievement since 60 per cent of the able-bodied males were employed outside their district.

In the Kitui district, 50 square miles were cleared of bush by communal labour to create new grazing areas, 8,959 acres of paddocks were fenced and 3,432 acres of grass were planted.

Coast Province.—In the Coast Province the demand for improved farming has developed slowly because, except in a few areas, there is as yet no great pressure of population on the land. In areas in which cattle can be kept the use of manure is becoming more common. In the Kaloleni division of Kilifi district, where 12 manuring demonstration plots were established, the number of manured farms increased from 165 to 268. Similar work is in progress in the Kwale district, in the drier parts of which the planting of bananas in deep pits is becoming popular. In the more populous Teita Hills, new areas were bench terraced for coffee and irrigated vegetables, and a start was made on the consolidation and enclosure of holdings. Loans towards the cost of improvements to individual holdings were granted to selected farmers in the Voi, Kwale and Kilifi districts.

Reconditioning, Resettlement and Development Schemes

Considerable progress has been made on a large number of schemes for the improvement of particular areas in the African land units. The African Land Utilization and Settlement Board has now been renamed the African Land Development Board (A.L.D.E.V.) and is at present responsible for 37 such schemes financed by the Kenya Government. Other projects are paid for by the African District Councils from their Agricultural Betterment Funds, and the cotton growing areas in the Nyanza and Coast Provinces are each benefiting from the expenditure of £200,000 set aside in 1952 from their provincial Cotton Sales Funds. The Swynnerton Plan, towards the cost of which Her Majesty's Government has made a grant of £5,000,000, provides for a more general and a very much more rapid development of the African lands in the five-year period 1954–58.

The responsibility for the local integration of existing schemes lies with the provincial and district teams, of which the local agricultural officers are members. The progress of schemes with which agricultural officers were particularly concerned in 1953 is here described.

NYANZA PROVINCE

Lambwe Valley.—Preliminary work continued in connexion with the settlement of this tsetse fly infested valley in South Nyanza. As a result of an ecological survey of the main valley, it was decided that the size of the holdings

could be reduced from 50 to 20 acres. Preparatory work completed at the end of 1953 included 11 tank dams, 7 successful boreholes and 38 miles of roads. The number of families actually settled in the Samunye branch valley increased from 101 in 1952 to 320 in 1953.

Kimulot Scheme.—The object of this scheme is the settlement of 7,450 acres of undeveloped land in the Kericho district. The improvements provided include 29 miles of roads, 6 wells and a market place. In 1953, 154 farms were surveyed and demarcated and 83 of these were allocated to families.

Chepalungu Scheme.—This provides for the clearing and settlement of a mile-wide border strip in order to prevent the entry of tsetse fly into Kericho district from breeding grounds in Masailand. By the end of 1953, 36 square miles of bush had been cleared and settled, and the boundaries both of the Sotik European area and of Masailand had been fenced. In the backward Chepalungu area, 70 miles of roads and 66 dams have been built during the past four years.

Central Province

On account of the ravages of *Mau Mau*, no progress could be made with the irrigation trials on the Mwea Plains or with the scheme for high-priced cash crops in the Nyeri district. However, at Mwea, Tebere and on the Thika River, camps were built for Kikuyu detainees who will dig canals in these areas as part of what, by Kenya standards, will be large-scale irrigation schemes.

Southern Province

Machakos District Reconditioning Scheme.—This scheme provides for the general reconditioning of the eroded Machakos district by the construction of soil and water conservation works, the afforestation of the hilltops and the promotion of improved farming, including the growing of cash crops. During 1953, 13,578 acres were protected by narrow base terraces constructed by communal labour and the mechanical unit terraced 3,000 acres and built two dams. Fifty-five acres of trees were planted and a further 4,000 acres were set aside for afforestation. The Machakos African Sisal Scheme made good progress and coffee nurseries were established at Kangundo, Matungulu and Mbooni.

Makueni Settlement Scheme.—1953 was the third year of an initial five-year plan to settle 1,250 landless Wakamba families in this area that was previously infested with tsetse fly. During the year, 317 new farms covering an area of 15,000 acres were surveyed and occupied. Settlement is well ahead of schedule, the number of families settled by the end of 1953 being 908 and the total population 5,800. The total occupied area was 40,000 acres, of which 4,750 acres were under cultivation. Insistence on the observance of a few basic rules of good husbandry not only made this settlement possible but also preserved the Makueni settlers from the famine that afflicted the rest of the Machakos Akamba in 1953.

Kamba Grazing Area.—The existing schemes on the Yatta Plateau and at Simba-Emali are concerned with the clearing of tsetse-infested bush, and the provision of water supplies to enable these large areas of dry country to be used for grazing under controlled conditions to relieve the present serious overstocking in the Machakos district. Although the grazing was affected by the drought a good soil cover was maintained and these as yet partially-developed grazing areas fulfilled their purpose by supporting 29,000 head of cattle and 20,000 head of small stock. The Swynnerton Plan provides for the development of the whole of the Emali–Lower Makueni area as a vast ranch.

Coast Province

Gede Settlement Scheme.—The number of families increased from 340 to 375, bringing the total population to 1,785. The settlers harvested excellent crops, particularly cotton, and the average cash income in 1953 was £27. The extension

area of 10,000 acres was surveyed and a start was made on the development of roads and the demarcation of holdings. A four-mile pipeline was laid to take fresh water to the Mijomboni settlement.

Shimba Hills.—The results of agricultural experiments continued since 1951 have provided a basis for the settlement of this inherently infertile area of 36,000 acres in the Kwale district. Roads and water supplies have been provided and 3,000 acres have been cleared of tsetse bush. The Teita have shown no enthusiasm for the area and the settlement of 750 surplus Wakamba families on a rent-paying basis will begin in 1954.

Coast Hinterland Scheme.—This scheme, financed and staffed by A.L.D.E.V., aims to open up the hinterland of the Kwale and Kilifi districts at present sparsely populated on account of lack of water, poor communications and the presence of tsetse fly. During the year 10 dams were constructed and 94 miles of new roads were built. These works were effective in drawing stock away from the over-grazed and eroded Mariakani area. The re-settlement of Waduruma families in the 2,000-acre clearing at Vigurangani made little progress because the settlement rules were unpopular in a district where there is no shortage of land.

Soil and Water Conservation

Soil Conservation Engineers' Headquarters

The Senior Soil Conservation Engineer is the chief advisory officer on all matters involving soil and water conservation in the European and African areas. In addition to his advisory work, he supervises the Engineers' Section of the Soil Conservation Service, the operation of the three Government-owned heavy dam construction units, the two "Agron" repair workshops, the school for African levellers and the work on farm and field drainage. An appreciation of the variety of his advisory work may be gained from a mention of some of the problems that engaged the attention of the Senior Soil Conservation Engineer in 1953. In the Nyanza Province these included surveys for and construction of dams in the African areas, the Nyakatch reconditioning scheme, drainage experiments at Sotik and soil conservation in the Songhor-Muhoroni area. In the European areas of the Rift Valley Province the problems included the distribution of water supplies on farms near Nakuru, drainage lines and water disposal on the Kinangop, farm planning at Kitale and Thomson's Falls, and the contour planting of sisal at Hoey's Bridge: in the African areas they included land utilization on the Kipkarren farms and the development of communications in Nandi. In the Central Province the Senior Soil Conservation Engineer advised on soil conservation in coffee, sisal and pineapples, and supervised a topographical survey in Machakos. In the Coast Province he was concerned with bench terracing in the Teita Hills, the disposal of flood waters at Kilifi, the rehabilitation of eroded areas at Mariakani, gulley control at Matuga, and terracing, cut-off drains and box ridging in the Shimba Hills. He also advised the Railway engineers and the County Councils on their erosion and drainage problems.

Buildings.—The provision at Nakuru of a new headquarters for the Soil Conservation Service has greatly facilitated the work of all sections. European and African staff, offices and workshops are now accommodated on one site: at the end of 1953 the Public Works Department had still to build one European bungalow and two blocks of African quarters to complete the scheme. During the year small additions were made to the workshop buildings at Nakuru and Kitale.

Workshops.—Although some jobs were delayed because spares were not available in East Africa, the "Agron" workshops undertook the full maintenance and overhauls of all tractors, machinery and vehicles operated by the Soil Conservation Service and of Departmental vehicles and farm equipment in their

vicinity. In the Nakuru workshop 225 jobs were completed of which 54 were major overhauls. In the Kitale workshop, besides completing 398 jobs, of which 26 were major overhauls, useful experimental work was done on the development of a combined maize, grass seed and fertilizer drill, grass and clover seed harvesters and clover seed scarifiers.

Levellers' School.—A refresher course was held for staff from the Nakuru, Thomson's Falls and Ruiru soil conservation units, and a trade test for levellers due for promotion was conducted in November. A short course in surveying was given to new Assistant Soil Conservation Officers and visits in connexion with the survey courses were made to the training centres for African Agricultural Instructors in the Nyanza, Central and Coast Provinces.

Aerial Survey.—All ground control work in connexion with the 1950 and 1951 aerial survey programmes was completed and the plans supplied to the farmers concerned.

Soil Conservation—European Areas

Terracing.—In spite of many difficulties connected with the Emergency, the ouput of work of the six mechanical terracing units of the Soil Conservation Service was a record one. The area of farmlands protected against erosion in 1953 was 27,722 acres, compared with the previous record of 27,189 acres in 1952. The total area of farmland protected against erosion by the Department's mechanical units has now reached 157,215 acres. In 1953 a large part of the increase occurred on the Kinangop Plateau, where the advantage of a dry year was taken to protect more than 9,000 acres by diversion ditches. Nevertheless, out of a total possible operating time of 69,258 tractor hours, 33,724 were lost due to breakdowns, lack of spares and to some extent to rain and standing crops. Much of this loss of possible operating time was due to dislocation caused by the Emergency. Several of the European officers in charge of the units were called up for full-time duty and nearly all of them did part-time duty in the Kenya Police Reserve. Many of the skilled African staff of levellers, tractor drivers and terracer operators were Kikuyu who had to be replaced by untrained men of other tribes. In addition, the work suffered from the general shortage of labour, and on some farms terracing could not be done because the farmer had no labour to harvest his crops. In these circumstances, the 1953 output was a creditable one. Comparative figures are set out below, and details of the work done in 1953 are given in Table E.

Acreages Protected by Soil Conservation Measures

District	1941–50	1951	1952	1953	Total
Trans Nzoia	23,739	4,035	6,455	5,924	40,153
Uasin Gishu	15,546	5,354	5,366	4,240	30,506
Nakuru	31,451	5,523	5,624	4,819	47,417
Thomson's Falls ..	6,712	2,287	8,246	10,493	27,738
Nyanza	3,904	1,190	1,080	1,355	7,529
Nairobi	1,389	1,174	418	891	3,872
Total	82,741	19,563	27,189	27,722	157,215

Permanent Crops.—In the Nyanza and Nairobi areas achievement cannot be measured solely by the output of terracing, because much of the land is occupied by permanent crops such as tea and wattle in Nyanza, and sisal, coffee and pineapples in the Nairobi district. Losses due to soil erosion in such crops are not so obvious as those in arable crops, and it is difficult to superimpose soil con-

servation works in existing plantations. Nevertheless, progressive planters are now aware of the need for contour planting, and on steep slopes, for additional protection in the form of diversion ditches and terraces. The acreage of permanent crops known to be protected by contour planting and/or terraces is shown below:—

Soil Conservation in Permanent Crops (Acres)

Crop	1941–50	1951	1952	1953	Total
Sisal	2,561	265	571	1,918	5,315
Wattle	4,114	59	157	226	4,556
Tea	2,424	565	560	496	4,045
Coffee	415	436	109	88	1,048
New Zealand Flax ..	649	—	350	—	999
Total Acres ..	10,163	1,325	1,747	2,728	15,963

In the case of the coffee crop, the increased use of mulch is reducing the need for terracing.

Farm Planning.—Although soil conservation is only one aspect of the subject, progress on farm planning is recorded here because the Assistant Soil Conservation Officers make the surveys and the boundary and contour maps which form the basis upon which the layout and farming programme is planned. In the second and more difficult stage, the farmer and the Agricultural Officer together plan the layout of fields, roads, buildings and water supplies, the cropping and stocking, labour and machinery requirements, and the economics and capital development of the holding. As a result of this work the farmer is presented with a sound and comprehensive development plan in the execution of which the Agricultural Officer assists by frequent visits and advice.

The area of farms fully planned in the course of a year has increased from 7,244 acres in 1951 to 9,302 acres in 1952, and to 21,814 acres in 1953. The demands for detailed farm plans have increased so much that the present agricultural staff is unable to deal with them. Mr. Troup wrote, "the further development of farm planning should be encouraged at all costs", and although the acreage of farms fully planned in 1953 was a record one, it was still only a third of that required for the fulfilment of Mr. Troup's 10-year plan. The required increase in staff and equipment is under consideration by Government. Details of the work accomplished in the two stages of farm planning in 1953 are given below:—

Farm Planning, 1953

District	*Farms Surveyed and Mapped*		*Farms Planned*	
	No.	*Acres*	*No.*	*Acres*
Nakuru	12	11,506	10	7,151
Thompson's Falls	7	6,967	1	1,700
Uasin Gishu	8	9,250	5	6,250
Trans Nzoia	7	11,643	5	5,393
Nyanza	4	4,120	2	1,320
Nairobi	1	2,520	—	—
Total: ..	39	46,006	23	21,814

TABLE E—SOIL CONSERVATION SERVICE—EUROPEAN AREAS—OUTPUT OF TERRACING FOR YEAR 1953

DISTRICT	No. of Farms Treated by Tractor	ACREAGE PROTECTED BY					COMPLEMENTARY WORKS					
		Broad Base and V Terraces	Diversion Ditches (*a*)	Narrow Base Terraces	Bench Terraces	Total	Roads	Ex-cavation (*b*)	Training Banks	Outlet Drains	Cut-off Drains	Small Dams
							Yards	Cubic ft.	Yards	Yards	Yards	Cubic Yd.
Trans Nzoia ..	28	5,232	692	—	—	5,924	101,936	535,760	7,940	7,200	30,083	15,000
Uasin Gishu ..	65	3,242	993	—	5	4,240	41,529	—	2,531	10,367	17,431	77,558
Nakuru	54	3,799	1,000	20	—	4,819	38,442	—	12,996	1,240	52,530	38,230
Thomson's Falls	43	737	9,756	—	—	10,493	76,269	423,490	37,151	7,957	14,408	18,150
Lumbwa ..	19	805	550	—	—	1,355	28,859	158,333	1,111	7,827	8,643	—
Nairobi	10	790	—	84	17	891	29,718	81,058	1,358	2,433	10,445	7,400
TOTAL ..	219	14,605	12,991	104	22	27,722	316,753	1,198,641	63,087	37,024	133,540	156,338

(*a*) Diversion ditches or cut-off drains used as sole protection on slopes up to 4 per cent on planned farms but not as part of a terrace system.

(*b*) Completion of terracing, finishing off high and low spots and levelling ant-hills by farmers or Soil Conservation Service labour or machines (bulldozer, traxcavator or scraper).

Dam Construction.—One of the greatest needs on farms is an adequate distribution and reticulation of water supplies. While this is one of the principal considerations in farm planning, the need can often only be met by the construction of farm dams and ponds, of which, in areas of fair to good rainfall, a number of small ones are often of greater value than a single large one. For this reason farm dams and ponds are generally too small for construction by the heavy mechanical Dam Construction Units of the Soil Conservation Service. The Uasin Gishu, Thompson's Falls and Ruiru Soil Conservation Units have made a number of small dams in recent years and, in 1952, the Water Resources Authority approved an allocation of £30,000 to equip Soil Conservation Units with dam-building machinery. Of this allocation, £15,000 was expended in 1953 and the remainder is available for expenditure in 1954. The additional equipment has increased the usefulness and efficiency of the Soil Conservation Units by enabling them to build dams in periods when, due to rain or growing crops, little terracing work can be done. The number of farm dams built by the Soil Conservation Units increased from 11 in 1952 to 40 in 1953. Further details of this work are given in tabular form in a subsequent section of this report entitled "Water Conservation—Mechanical Dam Construction Units".

Soil Conservation Finance.—Government continued to meet the full cost of the Engineer's Headquarters, all the staff in African areas and the Advisory Services in European areas. Of the annual cost of the Operational Services in European areas, half was met by Government and half is to be recovered by charges to farmers. Charges to farmers for soil conservation work remained substantially the same as in 1952: from 1st September, 1953, small increases were made in 4 out of 12 items on the tariff. Charges invoiced to farmers on 400 accounts in 1953 totalled £55,480, compared with 267 accounts totalling £53,960 in 1952. Work on the recovery of debts continued, but of the £57,657 outstanding at the end of 1953, £22,358 was in respect of work done for farmers in the years 1947–1952.

Land and Water Preservation Ordinance.—The Director of Agriculture issued 166 Orders under the Land and Water Preservation Rules in 1953, of which 54 required the protection of land by terraces, diversion ditches or contour ploughing, 81 forbade cultivation in drainage ways, 16 provided for the closure of eroded land and 15 for the closure of river banks. The Assistant Soil Conservation Officer/Inspectors in each European district continued to inspect farms, to draw the attention of farmers to infringements of the Rules and to erosion, to advise them on the correct methods for ploughing and maintaining terrace systems, and to supervise the river scouts. One of the duties of the river scouts is to line out soil conservation works in the areas cultivated by resident labourers. The extent of this work was reduced after the exodus of Kikuyu from the European farms, but the area of "squatter shambas" protected against erosion in 1953 totalled 11,414 acres, of which 7,536 were in the Kericho district, 1,500 in the Uasin Gishu and 2,378 in the Nairobi district.

Soil Conservation—African Areas

Nyanza Province.—Soil conservation is highly developed in the Kericho district and in the higher areas of the South Nyanza district: the North and Central Nyanza districts are backward in this respect. The most common soil conservation measure is the grass filter strip, but trash lines are used extensively

in the Kisii Highlands and some narrow base terracing is still done in the lower areas of North and Central Nyanza. For most works the contour lines are pegged out by African Assistant Agricultural Instructors, but the responsibility for construction and maintenance lies with the individual farmer.

In the higher areas of Kericho, where most of the land is now enclosed by thorn hedges, there is no cultivation without effective grass filter strips. In the lower areas, where about 15 per cent of the cultivated land remains unprotected, 30 special Instructors were engaged to close this gap. In the Kisii Highlands the spider's web of trash lines is so effective as to cause water-logging in the wet season and grassed drainage ways must now be provided for the disposal of the surplus water. In the Central Nyanza district, 99 miles of new narrow-based terraces were constructed and 4,283 miles of grass filter strips were marked out during 1953. Kikuyu prisoners were employed on a large soil conservation scheme in the eroded area below the Nyabondo Plateau. In North Nyanza 95 miles of narrow-based terraces were constructed and 9,029 miles of grass filter strips were marked out. The filter strips were not all effective because the grass on many of them was over-grazed or burned during the dry season. Other soil conservation work in the African areas of Nyanza Province included the repair of eroded cattle tracks by communal labour and the planting of a large number of tree seedlings.

Rift Valley Province.—In the high rainfall arable areas fair progress was made with the construction of narrow-base terraces and the marking out of trash lines and grass filter strips. Work on the construction of narrow-base terraces by communal labour was concentrated in the Kabarnet Hills. In Nandi an attempt has been made to plan the soil conservation of the whole area on the basis of a system of cut-off drains on the contour.

In the semi-arid pastoral areas the position is still most unsatisfactory. The picture is one of over-stocking and over-grazing leading to severe erosion, particularly in the vicinity of the occasional watering points. The remedy lies in the provision of more watering points and salt licks, *coupled with* the enforcement of controlled grazing, and the improvement of the facilities for marketing livestock. The cost of this treatment is provided for in the Swynnerton Plan, under which these areas will be developed as ranches for the production of fat steers.

Central Province.—The Central Province was the area worst affected by the Emergency conditions that prevailed throughout 1953. The effect of those conditions on soil conservation work was twofold. On the one hand there was a reduction in the work on individual farms: on the other there was a large increase in communal work. Details of the soil conservation work done in the Central Province in 1953 are given in the accompanying Table F, and from these the reader will see that there was a decrease in narrow-base terracing, grass planting and the construction of cattle sheds, for which works the individual is responsible, and a large increase in the amount of bench terracing, bush clearing and reconditioning done by communal labour gangs. Although there was little improvement in the standards on individual farms, in the Province as a whole satisfactory progress was made. The Wakamba districts of Machakos and Kitui were detached from the Central Province and incorporated in the new Southern Province on 1st July, 1953. Soil conservation work in those districts is reported below under the heading "Southern Province".

The reduction in the output of new narrow-base terracing in the Central Province was due to the absence of many of the men from their farms on Home Guard duties, and on such work as clearing road sides to prevent ambushes and the construction of Police and Home Guard posts. The existing narrow-based terraces were well maintained and the mileage of such terraces reconditioned increased from 6,269 in 1952 to 8,345 in 1953. The people have realized that live wash stops above the terrace channels reduce the need for maintenance work and a greater mileage of *Coleus* and *Commelina* was planted for this purpose.

The most welcome feature of the year's work was the large increase in the acreage of bench terracing, which represents a permanent gain, both in soil conservation and in better farming. The effectiveness of bench terraces as a soil conservation measure and the fact that once constructed they require no maintenance, caused many African farmers to construct their own bench terraces rather than wait for the communal gangs to do this work. The planting on bench terraces of high-priced cash crops such as coffee and pineapples is encouraged, and since such crops are manured, bench terracing makes for fertile land and prosperous farmers. Outstanding progress was made in the Kiambu district where the output of completed bench terracing increased from 8 acres in 1952 to 1,316 acres in 1953. In the Embu district, where there was also a large output, narrow-base terraces with the bank above the channel are being converted into bench terraces by inter-terrace cultivation and soil wash.

The area of bush and bracken cleared in the Central Province reached the record figure of 47,103 acres. While the object of much of this work was to deny cover to the enemy, the result was a valuable addition to the grazing land, particularly in Kiambu, where the bush clearings were immediately fenced into paddocks and planted with grass. In Embu, where a larger area was cleared, the result was less valuable since no grass planting or fencing was done. In the Fort Hall district alone, 10,586 acres were cleared of bracken and experiments were made in improving the productivity of the cleared area by the planting of better grasses and the application of lime and phosphate. In Nyeri district the establishment of a prohibited area round the forest fringe and the peoples' fear of *Mau Mau* prevented progress in the bracken zone. In the other areas good work was done in the setting apart of steep hillsides as African District Council Forest Reserves.

Southern Province.—There was a severe drought during the first nine months of the year, the soil was very hard, the people suffered from hunger, and 60 per cent of the men of the Machakos district left home in search of work. In these circumstances the construction of nearly 4,000 miles of narrow-base terraces by hand labour was a remarkable achievement. Still more remarkable was the protection of 9,523 acres by bench terracing. In the Kitui district, where hunger was less severe, narrow-base terracing increased by 60 per cent and bench terracing tenfold. For the Province as a whole, about 40 per cent of the able-bodied men achieved 55 per cent of the target set. Due to staff difficulties and breakdowns, the output of the mechanical terracing unit was poor. The tractors terraced 3,000 acres and built two dams, while the survey section mapped 4,000 acres of individual holdings which are to be re-planned on a topographical basis.

Grazing areas in the Kitui district were extended by the clearing of 50 square miles of bush by communal labour. In the relief grazing areas of Machakos district, further clearing of tsetse-infested bush was done by fuel contractors, prison labour and a bulldozer. Grass planting was delayed by the failure of the long rains, but most of the nearly 10,000 acres planted during the short rains grew well. In Machakos the drought precluded progress in the vital matter of grazing control, but in Kitui large grazing control schemes were in operation in most locations. Five thousand acres of hilltops in Machakos were set apart as African District Council Forest Reserves.

TABLE F—SOIL CONSERVATION FIGURES FOR 1953—CENTRAL PROVINCE

DISTRICT	Narrow base Terracing	Bench Terracing	Wash-Stops	Areas Closed or Recon-ditioned	Bush or Bracken Clearing	Grass Planted	Cattle Sheds Built	Compost Pits in use
	Acres	*Acres*	*Miles*	*Acres*	*Acres*	*Acres*	*Number*	*Number*
Meru	1,499	742	223	3,797	7,776	1,358	201	7,083
Embu	10,710	3,621	2,552	6,748	9,133	342	184	639
Nyeri	4,759	828	1,473	4,515	9,311	2,529	1,111	16,195
Fort Hall	13,625	791	1,786	10,012	14,383	—	7,007	13,856
Kiambu	7,990	1,316	417	19,913	6,500	5,464	4,330	(*a*)
Machakos (*b*)	13,578	9,133	—	—	—	6,400	92	—
Kitui (*b*)	2,825	390	1,266	9,672	31,835	3,432	12	—
1953	54,986	16,821	7,717	54,657	78,938	19,525	12,937	37,773
1952	71,487	4,375	5,387	41,535	42,603	32,307	28,959	36,792
1951	69,061	590	4,977	88,896	23,320	42,491	12,501	28,053

(*a*) Figures not known.

(*b*) The Machakos and Kitui districts became part of the new Southern Province on 1st July, 1953.

Coast Province.—The most progress in soil conservation was made in the Voi district, where there is now hardly any arable land without some form of protection. In 1953, in this district, 920 miles of narrow-base terracing were constructed, 648 miles of heavy trash lines were laid, and 443 miles of live wash stops were planted. The good rains greatly assisted the establishment of the live wash stops. In the Teita Hills, 29 acres were bench terraced for coffee and a smaller area for vegetables under irrigation. In the annual programme for the control of gully erosion in the foothills, 388 gullies were protected by the construction of 6,425 gully stops.

In the Kwale and Kilifi districts, where African conservation teams instructed the people in the proper spacing and pegging of trash lines, 1,046 miles of trash lines were laid to protect 3,150 acres. The area of tsetse infested bush cleared at the Shimba Hills settlement scheme in the Kwale district reached 3,000 acres. In the Kilifi district, 156 holdings on very steep slopes were closed to cultivation. In the settlement area of the Hinterland Scheme blocks were laid out for controlled grazing, and a grazing scheme was started at the Kayafungo development area. Control over grass burning was maintained throughout the Province.

Water Conservation—Mechanical Dam Construction Units

The Engineer's Section of the Soil Conservation Service is responsible for the work of three organizations engaged in the building of dams: these are the three Government-owned heavy Dam Construction Units, the five district Soil Conservation Units that are equipped with dam-building machinery and a contractor employed by the African District Councils to build dams in the Nyanza Province. Of the three heavy Dam Construction Units, Nos. 1 and 2 were originally established out of Development and Reconstruction Authority funds; No. 3, formerly the North Nyanza Dam Construction Unit, was purchased and re-equipped out of the Nyanza Cotton Sales Fund for work in Nyanza Province. The three heavy units operate to a programme approved well in advance by the Colony Water Resources Authority, but apart from that, the Engineer's Section is responsible for all the work of the above dam-building organizations. This work includes the selection and survey of dam sites, the designs, specifications and estimates for dams, and the supervision of and accounting for the construction work.

Since the beginning of the scheme, the three heavy units and the contractors supervised by the Engineers' Section have built 283 dams and large waterholes, providing storage for 3,489 million gallons of flood water at a cost of £220,000. The 177 dams built in the European mixed farming and ranching areas have provided water storage at an approximate intensity of one dam of 12 million gallons per 23,500 acres. Although the dams built by farmers themselves and by the district Soil Conservation Units have probably doubled this intensity, nevertheless, a very large amount of water development work remains to be done before Mr. Troup's aim of "a distributed system of water for every farm" is achieved.

The year 1953 was a favourable one for dam construction on account of the long periods of dry weather that prevailed in the areas of operation. That the full advantage of the weather could not be taken was due to the frequent changes of staff caused by the Emergency and to the need to overhaul No. 2 Dam Construction Unit and to re-equip No. 3. Nevertheless, the number of dams

constructed by the three organizations increased from 72 in 1952 to 95 in 1953, and the water storage capacity created by the year's work increased from 665 to 950 million gallons. The number of farm dams built by the Soil Conservation Units increased from 11 in 1952 to 40 in 1953, thus amply demonstrating the value of the additional equipment provided by the Water Resources Authority. Details of the work done are given in the following table:—

DAM CONSTRUCTION—1953

UNIT	No. of Dams	Earth Moved	Water Storage	Cost per Cubic Yd.	Tractor hours worked	Mean output per tractor hour
		Cubic yd.	*Mil. Gal.*	*Sh. cts.*		*Cubic yd.*
HEAVY UNITS:						
No. 1 D.C.U. ..	19	202,017	443.0	1 85	5,117	39.5
No. 2 D.C.U. ..	24	303,893	152.0	1 44	6,276	48.4
No. 3 (Nyanza) D.C.U.	3	94,467	53.0	1 44	1,111	85.0
S.C.S. UNITS:						
Eldoret	14	77,558	158.7	1 17	1,766	44.0
Thomson's Falls ..	3	18,150	—	—	642	28.3
Kitale	6	15,000	13.3	—	282	53.2
Nakuru	16	38,230	19.8	—	1,139	33.6
Ruiru	1	7,400	2.0	1 63	223	33.2
CONTRACTOR:						
South Nyanza ..	2	24,580	15.0	1 90	833	29.6
Central Nyanza ..	7	77,883	93.0	1 44	3,039	25.6
TOTAL	95	859,178	949.8	—	20,428	42.1

NOTE.—The above figures do not include the large number of dams built by the African Land Development Board, African District Council units and by communal labour. Particular of these will be found in the subsequent section headed Water Supplies, African Areas.

No. 1 Dam Construction Unit moved from the Athi River catchment area to the Rift Vally catchment area in December, 1952, and built four dams in the Naivasha district during January, 1953. In February, the unit movd to the Karara Estate at Hoey's Bridge, where it built a dam to store 286 million gallons of water at a cost of £6,082. The unit returned to the Nakuru area in April to build five more dams and then in August moved to the Uasin Gishu and Elgeyo districts, working northwards from there into the Trans Nzoia where it was still operating at the end of the year. The No. 2 Dam Construction Unit worked throughout the year in the South Nyanza district on a construction programme paid for from funds at the disposal of the African District Council. During the year this unit built 24 dams with a total water storage capacity of 152 million gallons. The No. 3 unit started the year on the big Karara dam at Hoey's Bridge which was subsequently completed by No. 1 Dam Construction Unit after No. 3 had been withdrawn for re-equipment. With new tractors and scrapers, the unit started work again in the Samia area of Central Nyanza in October, where, by the end of the year it had built one dam and two large waterholes. Messrs. Temoyetta, Ltd., contractors, built two dams in South Nyanza in January, and then moved to Central Nyanza, where they built seven dams and completed their contract in November.

Dam Construction Finance.—The charge for the work of Nos. 1 and 2 Dam Construction Units was increased in September from Sh. 70/- to Sh. 85/- per tractor hour. The accounts rendered for the work of the two units during the year amounted to £36,092, compared with £37,986 in 1952. Accounts outstanding at the end of 1953 totalled £46,630, of which £24,182 was in respect of dams constructed in the years 1948–1952 inclusive.

WATER SUPPLIES—AFRICAN AREAS

Nyanza Province.—A total of 46 dams and large waterholes were built in Nyanza Province in 1953, 36 of them made by mechanical dam construction units, as related above. In North Nyanza a large dam was built at Bukura, boreholes were sunk at a number of Location Centres and a windmill was installed at Hamisi. Elsewhere, wells were dug around the boreholes and a number of springs were protected. In South Nyanza five new wells were sunk during the year and 54 springs were protected by the Health Inspector. In the Kericho district, where there are several thousand self-contained African farms, farmers are being encouraged to provide their own individual water supplies by such means as roof catchment and storage tanks, shallow wells and hand pumps, piping from protected springs, and by the use of furrows, rams and pumps.

DAMS AND LARGE WATERHOLES CONSTRUCTED—NYANZA PROVINCE

	Before 1951	*1951*	*1952*	*1953*	*Total*
North Nyanza	13	9	10	1	33
Central Nyanza ..	11	17	10	13	51
South Nyanza	5	4	20	32	61
Kericho	98	6	11	—	115
Total ..	127	36	51	46	260

Rift Valley Province.—During the year one dam was constructed in West Suk and three in Elgeyo. The Kondabilet dam in Elgeyo was of large proportions, the wall being 45 feet high. In Baringo work was limited to cleaning out existing dams which had silted up as a result of the lack of ground cover. In Nandi several farmers dug wells for their own use, and these proved most satisfactory.

Central Province.—The Nyeri African District Council tractor could not work because it was impossible to get drivers who were prepared to face the risk of being sniped. However, a few small dams were built by hand labour, and in the Nyeri and Fort Hall districts some successful wells were drilled with hand rigs.

Southern Province.—In Machakos, communal dam construction work was limited by the hardness of the soil and the feebleness of the working oxen due to the lack of grazing. The mechanical unit of the Machakos Reconditioning Scheme built two dams. In Kitui, very good work continued on the construction of dams by communal labour under the supervision of the District Commissioner. The programme of dams for all locations was completed, the number built during the year being 45, which brought the total number of dams built in this programme to 277. With regard to other water supplies, two successful boreholes were harnessed at Makueni, two were drilled on the Yatta Plateau and one on the North Yatta.

Coast Province.—The grant-assisted Kilifi African District Council dam construction unit completed 28 new dams (seven of these in Malindi sub-district), bringing the total for the district to 158. In Kwale district the African Land Development Board's mechanical unit completed nine dams in the hinterland. With 10 more dams built by local effort and one in the Shimba Hills, the total number of dams in Kwale district is now 99. In the Voi district, pipelines were laid from three springs in the Teita Hills to reduce erosion on the hillsides. Water was piped to the Mijomboni Settlement from a borehole near Malindi.

Irrigation

Nyanza Province.—A detailed survey of the water resources of this Province is planned because of the rise in the level of Lake Victoria that will result from the Owen Falls dam across the White Nile and because of the large potential for irrigation and swamp reclamation.

Rift Valley Province.—A works camp for displaced Kikuyu was established at Marigat to construct an irrigation canal from the Perkerra River on to the Njemps Flats, where an initial irrigation scheme of 3,000 acres may later be extended to 6,000 acres.

Central Province.—Works camps for displaced Kikuyu were established on the Mwea and Tebere plains to construct irrigation canals from the Thiba and Nyamindi rivers to irrigate an area which may ultimately total 30–40,000 acres for re-settlement of Kikuyu families within their own Land Unit.

Southern Province.—The construction of a camp for displaced Kikuyu to dig a canal, commonly known as Jordan's Furrow, from the Thika River on to the Yatta Plateau for the benefit of the Kamba tribe was almost completed by the end of the year.

Coast Province.—Plans were prepared for a pump-irrigation trial on the Tana flood plain at Hola as originally suggested in the Harris and Sampson report of 1934 on the Tana River.

Field Drainage

The Senior Soil Conservation Engineer continued observations and trials on field drainage in the Sotik, Londiani, Ol Joro Orok and Ruiru districts, in all of which there are large areas of vlei land, the productivity of which can be improved by drainage. In Sotik, where there are thousands of acres of wet land studded with large ant-hills, locally known as "parkland", an experiment was started to find out how this land can be worked and what are its most economical uses. The drainage treatments compared shallow open drains with ridge and furrow drainage, the ant-hills were either flattened to level or rounded sufficiently to grow crops, and other treatments were phosphate manuring and planting either to grass leys or to arable crops. On a separate grazing trial, the effect of phosphate on drained and undrained land is being studied, drainage being provided by shallow ditches between the ant-hills from which the light bush is cleared but the larger trees are left for shade. The drought in 1953 hindered progress on this drainage experiment and it will be some years before conclusive results are available.

Following dry years in 1951 and 1952, the mole drainage experiments at Londiani produced a positive result in 1953 when 8.25 inches of rain fell during June. Mole drainage produced an increase in the yield of wheat of 256 lb. an acre, the mole-drained fields were more easy to cultivate and to harvest with a combine, and in a wet season mole-drained fields could be harvested two weeks earlier thus avoiding loss of crop. In the experiment on grassland, mole draining effected a great improvement and the cattle grazed the drained land evenly throughout the wet season.

In the experiment on ridge and furrow drainage at Ol Joro Orok there was no significant difference in 1953 in the yield of oats grown on ridges 12, 18, 24 and 36 feet wide. The yields on the drained land ranged from 12 to 14 bags an acre, being more than double the average yield for the Colony. From one ridge and furrow drained field in the Thomson's Falls area a yield of 19 bags of oats an acre was obtained. In another experiment at Ol Joro Orok a single

perimeter drain was compared with a grid of faggot drains 100 feet apart. The effect of faggot drains at frequent intervals was to increase the yield of oats from 5.5 to 8.5 bags an acre. In the Ruiru district, where much interest is being shown in the drainage of vleis to grow mulching material for coffee, an experiment was started on an improvement on ridge and furrow drainage by ripping the clay pan beneath the furrows.

Of the drainage work completed in 1953, the most progress was made on the Kinangop, where more than 9,000 acres were drained by the construction of diversion ditches. The area of vleis drained was 194 acres in the Ruiru district and 180 acres at Tohmson's Falls. In the Kitale area, 8½ miles of herring-bone drains were marked out for a farmer to construct with his own drainage machine. In the Nakuru district the survey of the Rongai-Menengai drainage scheme was completed and the drainage lines were demarcated by scrap railway sleepers.

Agricultural Education

Egerton Agricultural College

Of the twelve students who started the final year of the Diploma Course, eleven completed it successfully, as did eight of the nine students in the first year of their Diploma Course. Five of the fifteen students taking the Certificate Course were successful at the end of the year, and another four students who failed in only one or two subjects were allowed to re-sit those examinations. The College year was changed to begin in September and end in June instead of running from January to December. In the new academic year that began in September, 1953, nine students were enrolled in the Diploma and two in the Certificate Course, all of whom passed their term examination in December. The call-up of European manpower in connexion with the Emergency reduced considerably the enrolment of students from Kenya and for the time being the College depended largely upon students from outside the Colony. The demand for Egerton-trained men was still far in excess of the supply. During July and August two short courses for mechanics were run in conjunction with Messrs. Farm Machinery (Distributors), Ltd.

The College farm had a difficult year due to the drought, but fair yields of cereals were harvested and the production of the dairy herd was maintained on home-grown fodder and oat grazing. At the end of the year, the plans for the establishment of the College on a self-governing basis had reached an advanced stage.

African Areas

Training of Agricultural Instructors.—The courses for African agricultural instructors continued at the training centres at Siriba (Maseno) in the Nyanza Province, at Embu for the Central and Southern Provinces and at Matuga for the Coast Province. The institution at Siriba is a Government Combined Training Centre under the Education Department, providing courses for teachers, veterinary scouts and health assistants, in addition to those for agricultural instructors, for which the Agricultural Department seconds staff. The training centres at Embu and Matuga are administered and staffed by the Agricultural Department. All three centres provide a two-year course of training for agricultural instructors, and the Embu school provides in addition a one-year Certificate course for would-be instructors from the backward tribes. The effort to raise the standard for entry to the two-year course from a pass in the Kenya African Preliminary Examination to that of a pass in the Kenya African Secondary Schools Examination met with some success in Nyanza Province, where six

holders of the K.A.S.S.E. Certificate entered the agricultural course at Siriba. Particulars of the instructors trained at the three centres during 1953 are given below:—

Province	Two-Year Course		One-Year Certificate Course	Total
	1st Year	2nd Year		
Nyanza	29	22	–	51
Central	17	13	8	38
Coast	17	16	–	33
Total Entered ..	63	51	8	122
Failed	6	4	–	10
Total Passed ..	57	47	8	112

The land attached to each of the schools has been divided up into a number of small holdings on which are demonstrated the systems of farming best suited to the various areas from which the trainees are drawn, as well as the fact that a good living can be made from a small area that is well and intensively farmed. The surveying and mapping of African holdings as a basis for the preparation of a farm plan was taught to a number of agricultural instructors in half-year courses at the Department's small survey school in Kisumu. For instructors from the Central and Southern Provinces, three refresher courses in elementary surveying and farm planning were given at the Embu centre. A total of 46 female agricultural instructors attended successful refresher courses held in the South Nyeri and Fort Hall districts.

Farm Institutes.—Farm institutes for the practical training of African farmers and their wives and families are most developed in the Nyanza Province where the Bukura Farm Institute in North Nyanza has been functioning successfully since 1949. In 1953, 21 families from North, Central and South Nyanza farmed holdings at the Institute under the one-year course in better farming methods. Most of the families justified their training and on their return to their own farms in the Reserve they will be visited and assisted by the district agricultural staff. The farming system practised on the holdings was intensified during the year by allocating stock to the individual trainees, by fencing the ley areas for intensive rotational grazing and by planting a cash crop of sugar cane and an observation plot of Robusta coffee. A dam with a capacity of 18 million gallons was built by hand labour to conserve water and provide fish for the trainees and staff. Four refresher courses were run at the Institute, one each for agricultural instructors, female agricultural instructors, adult farmers and farm planners. From the beginning of 1954 Bukura will become the District Farm Institute for North Nyanza, and the cost of the courses given there will be met by the North Nyanza African District Council.

For the Central Nyanza district, part of the land at the Siriba Government Training Centre will be developed as a farm institute in 1954. In the South Nyanza district an institute was opened at Kisii at which four families were trained in 1953 and land for another possible institute was obtained at Oyani. In the Kericho district holdings varying from 6 to 20 acres were laid out for the proposed institute at Kabianga. Proposals have been submitted for a farm institute in the Nandi district of the Rift Valley Province. As these institutes are developed and the holdings become managed more intensively, they should provide useful information on the economic returns that can be expected from the systems of intensive farming which are being advocated in various ecological zones by the Agricultural Department.

The courses for adult farmers given at the Jeanes School by the Community Development Organization were much appreciated by those who were fortunate enough to be selected to attend. During the year several such courses were given to groups of African farmers selected from each of the provinces.

School Gardens.—In the Nyanza Province agricultural instruction in the primary schools is given mainly in the school gardens, where the basis of study is the comparison of crop growth and yields on 21 plots, each of which illustrates one of the major principles of agriculture listed in the syllabus. Where necessary, the number and arrangement of the plots is modified to conform to the agricultural policy for the area in which the school is situated. In 1953 the standard of work in the gardens was variable: there were some good ones, particularly in North Nyanza, where the Essongolo School won the annual competition for the Watson Shield awarded for the best school garden in the district. At the intermediate schools most progress was made in the Kericho district, where eight model school farms were laid out.

In the Elgeyo and West Suk districts of the Rift Valley Province, the agricultural staff assisted with the teaching of agriculture at schools and an agricultural instructor was posted to the school at Kabarnet in the Baringo district. The Assistant Agricultural Officer, West Suk, did part-time teaching work and supervised the small holding at the Rift Valley Rural Secondary at Kapenguria.

In the Central Province agricultural instructors gave lectures at schools in the Nyeri, Fort Hall and Meru districts, but the *Mau Mau* organization impeded progress and destroyed many of the schools.

In the Machakos district of the Southern Province the development of new sub-stations and a better distribution of staff made possible regular visits to all school gardens with the result that the standard improved greatly. All gardens on sloping land were bench terraced and many other improvements were effected. In Kitui, where such detailed attention was not possible, the Agricultural Officer endeavoured to fill the gap by giving a course of lectures to the schoolteachers.

In the Coast Province an agricultural instructor was employed full-time on school garden work in the Voi district and two school garden competitions were run in the Kwale district. In the Kilifi and Tana River districts the 21-plot system was introduced, in the latter district only after the school committee had been convinced that the purpose of the gardens was to educate the pupils rather than to augment the school funds!

Young Farmers' Clubs and Better Farming Socieities.—In the European areas of the Rift Valley Province and in the African areas of the Central Province, the Young Farmers' Clubs experienced a difficult year because many European members were engaged on Emergency duties and many African members were intimidated by the *Mau Mau*. In that large part of Kenya where peace reigned the movement made good progress. In the African areas of the Rift Valley Province a very successful club was started at Chepkoria in Elgeyo and two clubs were formed in Nandi. In the Nyeri district of the Central Province several clubs were revived in the second half of the year and some new ones were formed. At the end of 1953 there were 19 clubs functioning in Nyeri district and 9 in Embu. In the Southern Province several men and women benefited from a course for Young Farmers' Club Leaders given at the Jeanes School, and the movement grew both in the larger schools and at the location centres where there were many honorary members not young in years though still young in farming knowledge. At the end of the year there were 11 active clubs in the Machakos district and 1 in Kitui. In the Uasin Gishu area of the Rift Valley Province the five Farmers' Associations for Europeans of all ages continued to do good work.

One of the most valuable educational activities of these clubs and associations is the visits paid by them to improved farming areas and to see specific improvements on particular farms. Most of the clubs in the Rift Valley and Southern Provinces made several such excursions during the year. The same principle applies to the numerous educational tours arranged by the District Agricultural Officers for chiefs, headmen, agricultural instructors and leading farmers. For those interested in particular crops such as coffee, sisal, fruit and grassland, the Department held Farmers' Days at the principal research stations.

Agricultural Shows

The Royal Show of the Royal Agricultural Society of Kenya was held at Mitchell Park, Nairobi, in October. The Department's exhibit, a demonstration of the feeding of dairy cattle with home-produced foods, was well-timed in view of the shortage and high cost of purchased feedingstuffs. The District Agricultural Officers accompanied large parties of African farmers who visited this Show.

In the African areas seven successful shows were held during the year. Five of these were in North and South Nyanza, one in Elgeyo in the Rift Valley Province and one at Mbooni in the Southern Province. The primary purpose of these shows is the education of African farmers through the medium of crop produce and livestock competitions and exhibits and demonstrations by Government departments and by an increasing number of commercial firms. Many thousands of African farmers attended these shows and many learned something from their visit. In addition to the educational aspect, the farmers had an enjoyable day's outing and the exhibitors gained in goodwill.

Marketing

Produce Marketing and Inspection

The Department continued to be responsible for the inspection and the first stage of the marketing of produce from the African areas under the various rules providing for the control of the marketing of maize and other produce, wattle bark, cotton, cashew nuts and copra. This inspection and marketing is supervised by nine marketing officers whose salaries and expenses are met from a small cess on each bag of maize and produce handled by the Maize and Produce Control. The marketing officers superintend a staff of African produce inspectors who are paid by the African District Councils from their Agricultural Betterment Funds, to which the revenue from inspection fees is credited. Details of the quantities and value of the produce that passed through the markets in 1953 are given in Table D on page 23.

In the Nyanza Province the produce inspection service operated with fair efficiency and in North Nyanza the quality of maize marketed improved to the extent that the proportion of Grade II increased from 70 to 75 per cent of the total. From the Central Nyanza and Kericho districts the surplus of controlled produce marketed was again small and the finances of both districts suffered from the reduction in the revenue from Agricultural Betterment Fund cesses. Difficulty in the control of marketing was experienced on the Uganda and Tanganyika borders of the Province where growers could sometimes sell inferior produce at higher prices when their home market was closed. This points to the need in the border districts for inter-territorial agreement on prices and quality. At Kendu Bay one of the stores was destroyed and two were badly damaged in a violent storm: it was fortunate that only one of the damaged stores contained any produce.

In the Central Province, despite the Emergency, normal produce inspection services were maintained and the quality of the produce delivered to Control improved. In the Kiambu district the marketing officer gave particular attention

to the inspection of vegetables, pineapples and wattle bark, with a resulting satisfactory improvement in the marketing of those crops. In the Machakos district of the Southern Province produce was inspected at railway stations on the main line and at Machakos and Tala. In the Kitui district inspection was begun at two centres, resulting in an appreciable improvement in the standard of produce marketed as well as in licensing and cess collection. In most districts of the Coast Province lack of funds precluded the employment of produce inspectors and inspection work was confined to cotton, cashew nuts, copra, wattle bark and kapok. In the Teita district, however, the Coast Province Marketing Inspection and Improvement Rules were enforced and by the end of the year the inspection and marketing of produce from this district was proceeding satisfactorily.

Co-operation

The first stage in the marketing of African-grown cash crops such as coffee, pyrethrum, pineapples and vegetables is done mainly through African producers' co-operative societies, whose business affairs are supervised by the Registrar of Co-operative Societies and his district staff of assistant registrars and inspectors. Since the value of these crops depends largely on the care taken in the growing, processing and grading, it follows that their successful production and marketing is the result of a joint effort on the part of the agricultural and co-operative officers.

For the marketing of coffee, five new societies in the South Nyanza district were registered, bringing the number of primary societies in the Kisii Coffee Union to 15. The Union built a new office and store and the Mount Elgon Society in North Nyanza built its factory. In the Central Province coffee co-operative unions were formed in Meru and Embu, and in Meru two new societies were registered. In the Coast Province the first coffee society formed in the Teita district marketed a good product.

The co-operative marketing of maize is most developed in the north of the North Nyanza district, where there are 40 societies, about half of which are members of the three co-operative unions. In 1953 these societies marketed 28,302 bags of produce, most of which was maize, for which they received the higher price paid on production of a certificate of good husbandry and delivery in three-ton lots. In Embu district the farmers' societies handled produce, mainly maize, to the value of £12,000.

The three pyrethrum societies in Nyeri district had a successful financial year and were able to pay a bonus. Between June and December the four pyrethrum marketing groups in Kiambu sold dried flowers to a net value of £17,700, with the final pool payment still to come. The average net return per grower on six months' production was £59. These marketing groups were formed into co-operative societies, which began to operate on 1st January, 1954.

The five pineapple growers' societies in the Kiambu district combined to open their own accounting office at Thika. In the seven months for which accurate records are available these societies sold pineapples to the value of £20,750. Six societies in the Nairobi area marketed vegetables and fruit through the Horticultural Co-operative Union. The Union established itself as the dominant organization in the vegetable trade and obtained the contract for 1954 for the supply of fruit and vegetables to Government institutions in and around Nairobi. In the Coast Province the Teita society sold vegetables in Mombasa to the value of £250–£350 a month, and four societies were engaged in the marketing of chillies. In the Colony as a whole, 99 African societies marketed agricultural produce to the value of £246,710.

GRADING AND INSPECTION SERVICES, MOMBASA

Inspection.—The number of packages of plants and plant products imported and inspected at Mombasa increased over four-fold, amounting in all to 753,165, mainly due to Kenya becoming an importer of maize and wheat. A new departure was the importation of two complete cargoes of Argentine wheat in bulk, which proved thoroughly successful. The quantity of castor seed exported increased to 321,025 bags from 258,071 bags in 1952, but of this total only 71,860 bags were of known Kenya origin. The quantity from the Kikuyu Reserve remained at about 55,000, but that from the Kitui area increased from 8,000 to 15,000 bags.

One hundred and eighty-two phytopathological certificates were issued, 100 being for coffee exported to Egypt.

Grading.—The previous year's export programme for maize continued into January of 1953, after which month for the rest of the year the only shipments were coastwise. Similarly with wheat, there were no exportable surpluses and all movements were purely coastwise. This wheat was graded under the new internal Grading Regulations. There was an exportable surplus of beans, almost entirely of the White Haricot type, but this crop was only about half the size of the 1952 crop. Potatoes and chillies were the only crops which were exported in comparable quantities to 1952, the former mainly on account of a new source of supply being found at Arusha, which provided 500 tons during the year.

PRODUCE GRADED FOR EXPORT (BAGS), 1953

	Maize	*Wheat*	*Potatoes*	*Beans*
K.1	—	11,822	—	3,816
K.2	—	1,771	27,947	4,303
K.3	—	1,005	—	25,332
K.4	—	4	—	10,629
K.5	—	300	—	—
K.6	—	—	—	13,661
K.7	—	311	—	—
K.8 Y.	5,742	—	—	—
K.8 C.W.	79,055	—	—	—
Total graded	84,797	15,213	27,947	57,741
Wet	342	265	—	—
Rejected	20	200	2,243	—
Rejected for bags ..	4,835	—	—	—
Total received	89,994	15,678	30,190	57,741

The quality of chillies (*Capsicum minimum*) showed a slight improvement, but capsicums (*C. annum*) were not as good as the year before, mainly on account of the failure of the crop at Mwatate, where the best capsicums are grown.

CHILLIES GRADED FOR EXPORT (BAGS), 1953

	Capsicum Minium	*Capsicum Annuum*	*Total*
G.A.Q.	32	—	32
F.A.Q.	1,650	13,885	15,535
Undergrade ..	3,348	22,779	26,127
Rejected	56	—	56
Total received ..	5,086	36,664	41,750

Conditioning.—After the previous year's programme was completed in the middle of January, the plant remained idle till June, when it was used to clean importations of maize. In August it was similarly employed, and from October to the end of the year it was almost fully employed drying wet Uganda maize for shipment to Tanganyika.

PRODUCE CONDITIONED (BAGS), 1953

	Conditioned	
Maize	145,551	
Beans	13,333	
Wheat	1,505	
Gram	2,391	
Cleaning only	2,292	Wheat, Rice, Lentils.
Total ..	165,072	

The plant was operated for a total of 2,547 hours during the year, of which 1,711 hours were during the last three months of the year.

Fumigation.—It was a good year for seed beans, and the number of operations increased from 26 in 1952 to 41 in 1953, but there was less demand for the treatment of other produce.

Finance.—Despite raising the charges for grading during the year, the quantities of produce presented for grading were so much below the average, there being no exportable surpluses of maize and wheat, that the grading service made a loss, and conditioning did, too, but their combined deficit did not quite amount to the credit balance remaining at the end of 1952, and the year closed with the combined grading and conditioning service £706 in credit.

PART IV—GENERAL

Library

Only some 190 books were added to the Library during the year. This was due in part to the increased cost of subscriptions to periodicals and the very high cost of some of the technical books purchased. The following periodicals were added to those already taken by the Department: "The Canadian Entomologist", "The Dairy Farmer", "Euphytica", "Journal of Ecology" and "Phytoma". Some 2,300 publications were circulated during the year to members of the Department and the public, though farmers made slightly less use of the Library than in other years, due no doubt to the extra calls made on their time by the Emergency. Statistical and other enquiries from consulates and commercial firms, on the other hand, showed no decrease and a good deal of work was done in collecting information and material for the Royal Commission. As last year, four issues of the departmental newsletter appeared.

Through the initiative of the Librarian at the Veterinary Research Laboratories, who does all the organizing as far as local libraries are concerned, this Library now participates in a scheme for exchanging spare parts of journals. Exchanges are made direct among local (Government) libraries and with libraries in America and Australia with which we have professional contacts, and through the British National Book Centre in London. As a result of both these methods 49 gifts were received, many of them particularly valuable as they completed sets, and 56 gifts were made during 1953.

Publications

The following is a list of articles by departmental officers published during the year:—

Bellis, E.—Fertilizer Responses in Relation to Soil Types: Field Recommendations. Paper submitted to the Conference of the Specialist Committee on Soil Fertility and summarized in *East African Agricultural Journal, 19,* 36.

———— Studies in the Fertilizing of Annual Crops in Kenya. Ibid. *19,* 33.

———— The Main Soil Groups of the European Areas of the Kenya Highlands and Their Utilization. *Appendix "E" to Report: Inquiry into the General Economy of Farming in the Highlands* (L. G. Troup).

Birch, W. R.—The Control of Spurrey. *Kenya Weekly News,* 6.11.53.

———— Pasture Improvement in Kenya. Ibid. 26.6.53.

Brook, T. R.—Soil and Water Conservation in Sisal. *Kenya Sisal Board Bulletin,* No. 5, July, 1953.

Dougall, H. W.—Fertilizer Experiments on Ley Establishment, Established Leys and Natural Pastures in Kenya Highlands. Paper submitted to the Conference of the Specialist Committee on Soil Fertility and summarized in *East African Agricultural Journal, 19,* 36.

———— Kikuyu Grass, I.—Seasonal Variation in Composition of Degenerate and Productive Pastures. Ibid. *19,* 36.

Jackson, T. H.—Pineapples for Profit. *Kenya Sisal Board Bulletin,* No. 6, October, 1953.

Jones, P. A.—Pectic Enzymes in Fermentation of Coffee. *Kenya Coffee Board Bulletin, 18,* 325.

Kroll, U.—The Effect of Fertilizers and Manures on Pyrethrum Yields. Paper submitted to the Conference of the Specialist Committee on Soil Fertility and summarized in *East African Agricultural Journal, 19,* 35.

Le Pelley, T.—Insecticidal Treatments Against the Mealybug Ant (*Pheidole punctulata*) on Coffee. *Kenya Coffee Board Bulletin, 18,* 569.

Melville, A. R.—Synthetic Organic Insecticides: Their Value and Limitations. Ibid. *18,* 324.

———— *et al.,* The Coffee Demonstration Farm, Rukera Estate. Ibid. *18,* 302, 347, 465.

———— The Management of Coffee Nurseries in Kenya. Ibid. *18,* 566.

Nattrass, R. M.—A Disease of Lucerne in Kenya. *East African Agricultural Journal, 18,* 97.

Nattrass, M. S.—Preliminary Trials of Soft Fibre Plants in Kenya. Ibid. *18,* 189.

Nichols, A. F.—Nursery Technique in the Cultivation of Sisal. *Kenya Sisal Board Bulletin,* No. 4, April, 1953.

Pereira, H. C., and Beckley, V. R. S.—Grass Establishment on Eroded Soil in a Semi-arid African Reserve. *Emp. J. Exp. Agric., 21,* 1, 1953.

Strange, L. R. N.—Notes on Temporary Leys in the European Farming Areas of Kenya. *Appendix "F" to Report: Inquiry into the General Economy of Farming in the Highlands* (L. G. Troup).

Schouten, J.—Pig Production, Ol Joro Orok Experimental Farm. Ibid. *Appendix "G".*

———— Summary of Development and Returns on an Actual Planned Farm. Ibid. *Appendix "K".*

Storrar, A.—The Principles of Farm Planning. Ibid. *Appendix "J".*

Spooner, R. J.—Proposals for a Farm Plan. Ibid. *Appendix "L".*

Thorpe, H. C.—A Note on the Release of new Cereal Varieties—iv. *East African Agricultural Journal, 18,* 98.

———— Cereals for 1953–54. *K.I.O. Fortnightly,* No. 245, February, 1953 (3232) and *Kenya Weekly News,* 13.2.53.

———— *Puccinia Polysora* in Maize: Progress Report on Breeding Work—I. Paper submitted to the Specialist Committee on Agricultural Botany. East African Agricultural and Forestry Research Organization, 1953.

Webster, C. C., and Lerche, K.—Soil Cover in Sisal Plantations. *Kenya Sisal Board Bulletin,* No. 7, December, 1953.

Agricultural Legislation

The following comprise the more important legislative changes effecting agriculture during 1953:—

The Native Lands Tea Rules, 1953.—Enacted under the Crop Production and Livestock Ordinance, these Rules cancel and replace the African Grown Tea Rules, 1950. They regulate the growing of tea in native lands with the object of maintaining good husbandry.

Nyanza Province (*Marketing of Dairy Produce*) *Rules,* 1953.—Enacted under the Crop Production and Livestock Ordinance, these Rules bring dairy produce (milk, cream, butter, ghee and cheese) in the Nyanza Province under the operation of the Ordinance. Purchase for manufacture for resale prohibited except at a dairy licenced under the provisions of an African District Council by-law. Price offered to be prominently displayed and based on standard trade measure and not altered during the hours of business in any one day. Authorized officers may inspect premises.

The Water (*Undertakers*) *Rules,* 1953.—Regulate the appointment and operations of public and local authorities and any other person supplying water and the duties of the consumer under the following heads: works and lands; breaking open roads, etc.; supply of water for domestic and public purposes; laying and maintenance of service and communication pipes; charges for water; provisions for preventing waste, including meters and other fittings; financial provisions; and various general and miscellaneous provisions.

The Water (*General*) *Rules,* 1953.—Comprehensive rules regulating the use of the water resources of the Colony, including such works as canals, irrigation, drainage and reclamation of swamps, storage of water, water power, ground water, fish protection and control. The Rules also cover the licensing of qualified engineers under the Ordinance, the formation of water associations, regional water boards, community (native areas) permits, forms, licences and fees.

The Grading of Wheat for Local Purchase Rules, 1953 (Wheat Industry Ordinance).—All wheat purchased throughout Kenya has to be graded and classified in accordance with the grades and classes set out in schedules to the Rules and is subject to deductions in price according to moisture content, foreign matter, insect damage, and percentage of Discount Wheat (scheduled varieties), and additions for Heavy Wheat (bushel weight 63 lb. and over) and Premium Wheat (scheduled varieties). Methods of sampling and determining moisture content and bushel weights are laid down. The percentage amounts, by weight, of moisture, foreign matter of various sorts, broken grain, insect, weather or heat damaged wheat, immature wheat and darnel permissable in a sample for assigning to a grade are laid down.

Other legislation enacted during the year was as follows:—

Ordinances.—The Sugar (Amendment) Ordinance; the Land and Agricultural Bank (Amendment) Ordinance.

Rules and Regulations.—The Agricultural Produce Export Ordinance: Grading of Cotton Rules and Coffee Export Rules revoked; increases in grading fees under the Grading of Maize, Wheat, Potatoes, Chillies and Beans Rules; Grading of Wattle Products Rules, 1953 (packages of products exported containing wattle bark or wattle extract to be clearly marked with country of origin in letters not less than one inch high). Coffee Industry Ordinance: traveller allowed to export up to 2 lb. coffee without licence. Crop Production and Livestock Ordinance: Native Lands Coffee (Amendment) Rules (additions to Schedule; Wattle Bark (Improvement and Inspection) Rules (additions to Schedules); Cashew Nut Marketing Rules (buying dates); Coast Province Marketing, Improvement and Inspection (Amendment) Rules (co-operative societies included in rule 2). Defence (Controlled Produce) Regulations: Prices and prohibition of movement orders. Defence (Control of Maize) Regulations: prices and prohibition of movement orders. Emergency Regulations: Control of Crops, Food and Dwellings Regulations, Farm Resident Labourers Regulations; Forest Area Labourers Regulations. Increased Production of Crops Ordinance: Date of operation extended to 31st December, 1954; *Datura stramonium* penalty suspended; usual orders. Marketing of African Produce: new Schedule; new fees for licences rules; milk, cream and paddy in Nyanza Province excluded from provisions of rule 2 of the main Rules. Plant Protection Ordinance: flax and linseed added to Import Control Order. Sisal Industry Ordinance: cess of Sh. 20 per ton or part thereof. Wheat Industry Ordinance: Licences and Permits Rules, 1953.

Staff

Departmental headquarters operated at full strength during most of the year, although many officers had their work interrupted by Emergency duties. The proportion of officers from the various services of the Department who were absent on leave was again below average. Once again only two newly-trained Agricultural Officers, Messrs. C. P. R. Nottidge and J. C. Templer, arrived to augment the field services. As there were no transfers or retirements, the number of vacancies for Agricultural Officers was reduced to eight, but proposals under the Troup and Swynnerton Plans will increase very substantially the vacant establishment for Research Officers, Agricultural Officers, Assistant Agricultural Officers, Assistant Soil Conservation Officers and Assistant Surveyors. Once again no Africans joined the Department from Makerere.

In the research and specialist sections the staff position again improved. With the appointment of three chemists and a plant pathologist, 34 out of 36 research officer posts are filled and there are only five vacancies in a total European establishment of 91.

In concluding this report, I wish to thank all members of the staff for their loyal support and co-operation during a very difficult year. Especial thanks are due to the many officers who have taken part in the Emergency, full-time and part-time, and to those in all Provinces who have had to shoulder the extra burden created by the loss of staff on Emergency duties. I would pay a particular tribute to those officers, European and African, who have carried on and intensified their agricultural duties in the danger areas of Central and Rift Valley Provinces. Finally, I record with grief the loss of a number of European and African staff at the hands of *Mau Mau*, including Messrs. G. M. Lavers, V. R. S. Beckley, V. G. Bianchi, L. K. Kameri and African Civil Service Instructors G. Macharia, W. W. Gichuru, E. Gitari, S. Mbogo and J. Wachira.

G. M. RODDAN,
Director of Agriculture.

G.P.K. 1866—630—8/54